

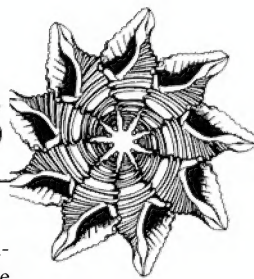
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American CONCHOLOGIST



Quarterly Journal of the Conchologists of America, Inc.

CONCHOLOGISTS OF AMERICA, INC.



In 1972, a group of shell collectors saw the need for a national organization devoted to the interests of shell collectors; to the beauty of shells, to their scientific aspects, and to the collecting and preservation of mollusks. This was the start of COA. Our membership includes novices, advanced collectors, scientists, and shell dealers from around the world. In 1995, COA adopted a conservation resolution: Whereas there are an estimated 100,000 species of living mollusks, many of great economic, ecological, and cultural importance to humans and whereas habitat destruction and commercial fisheries have had serious effects on mollusk populations worldwide, and whereas modern conchology continues the tradition of amateur naturalists exploring and documenting the natural world, be it resolved that the Conchologists of America endorses responsible scientific collecting as a means of monitoring the status of mollusk species and populations and promoting informed decision making in regulatory processes intended to safeguard mollusks and their habitats.

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In This Issue

Editor's comments -----	3
COA President's message -----	4
COA Lifetime Achievement Award (Doris Underwood) by Thomas Eichhorst -----	5
Spotlight on: Doris Underwood, COA President 1992- 94 by Lynn Scheu (reprint from <i>American Conchologist</i> 21(3): 10 (1993)-----	6
History matters: even to shellers by Alan Gettleman ----	7
Mollusks of the night: a group of living mollusks that you may never see again: blackwater diving! by Charles E. Rawlings -----	8
<i>Neptunea</i> Awards for 2020 by Everett Long -----	13
Dealer Directory -----	14
The living species of the tulip shells: <i>Fasciolaria</i> and <i>Cinctura</i> (Gastropoda: Neogastropoda) by Allen Aigen -----	16
As if by magic by Annie Olson -----	32
COA Academic Grants by Jan Vandetti -----	35
In memoriam: Lynn Scheu by Tom Eichhorst -----	36
Investigating patterns of post-metamorphic dispersal of the marine snail <i>Lacuna vincta</i> between eelgrass- and kelp-dominated habitats by Sasha Seroy -----	38
83 rd Annual Sanibel Shell Show, March 5-7, 2020 -----	40
St. Petersburg Shell Club Shell Show Feb. 21-22, 2020 -----	41
Conchologists of America Award through the years by Gene Everson & T.E. Eichhorst -----	42

Front cover: *Atlanta peroni* Lesueur, 1817, about 10mm shell length, photographed at night on a blackwater dive by Charles Rawlings. This and other fascinating deepwater, night-time, pelagic mollusca were photographed by Charles off Kona, Hawaii, at about 60 feet deep with about 1 mile of ocean between the divers and the bottom – at night with flood lights to attract predator and prey.

Back cover: *Melongena corona* (Gmelin, 1791), a common Florida shell that seemed appropriate to picture at this time. Checking with WoRMS I found probably 100 mollusks named *corona* or a variant. Image courtesy of Marlo Kriberg (www.olram9.wixsite.com/letstalkseashells).

Editor's comments: We start this issue with some changes to normal COA operations. Because COVID-19 caused the COA Board to cancel the 2020 COA Convention (see the President's message on page 4), we lost our opportunity to vote on the slate of nominated officers for 2020. This vote will now take place in 2021, with seated officers remaining in position until we can get our membership back together at Melbourne, FL.

2021 Slate of COA Officers

Thanks to Henry Chaney, Rick Edwards, and Linda Brunner for their voluntary and valued service on the 2019-2020 COA Nominating Committee, impanelled on June 21, 2019, at Captiva. They provided a slate of officers nominated for the (now) 2021 election. In turn, the Executive Committee of the COA recommends the following slate of officers for consideration for the next biennial term, which begins at the upcoming annual business meeting (Melbourne, FL; June, 2021) and concludes at the 2023 session in NC:

- President: Karlynn Morgan
- Vice-President: Everett Long
- Secretary: Amy Dick (incumbent)
- Treasurer: Steven Coker (incumbent)
- Trustee: Bruce Neville

As per COA bylaws, additional nominations and discussion will be heard at the Melbourne general business meeting.

In this issue: We have the normal eclectic selection of material, with maybe a bit more text than usual. On the other hand, we have images from Charles Rawlings, so that sets us up fairly well. We start with the slate of COA officers for 2021, followed by an important message from COA President Harry Lee. We then have a new COA Lifetime Achievement Award (first recipient is Doris Underwood), some interesting thoughts on history by Alan Gettleman, the afore mentioned photos and article by Charles Rawlings, the COA *Neptunea* Awards for 2020, an extensive overview of the Recent tulip shells of the genera *Fasciolaria* and *Cinctura* by Allen Aigen, the colorful clay artistry of Annie Olson, our 2020 COA Academic Grants by Jann Vandetti, a remembrance of Lynn Scheu who passed away in April, a COA grant report by Sasha Seroy, the shell show results of both Sanibel and St. Petersburg (both lucky enough to get their shows in prior to the COVID 19 mess), and a final look at the COA Award from its inception by Gene Everson, who has won a record 45 of these awards.

Tom Eichhorst

Dear COA members,

For nearly a half century COA has convened annually without interruption. COVID-19 has broken that streak, but while I must admit that's a very daunting blow, the organization is resolute in pressing on. Here's what I mean:

- We plan to reprise our Melbourne (FL) convention the same week next year (June 16, 2021) and expect it will usher in another half century and more of annual continuity, e.g., the 2022 convention is planned for Moody Gardens, Galveston, TX, and the Wilmington (NC) Hilton will host COA 2023. Anne Joffe, COA Convention Planning Director, and 2020/2021 Convention Co-chair Alan Gettleman deserve our gratitude. Dave Green and the NC team have been vital in our rescheduling initiative.
- Without a 2020 (annual) general business meeting, ".... the COA Board of Directors will take the necessary steps to properly conduct business" - an explicit provision in the COA Constitution (Article 6 paragraph B on the COA website: <<http://conchologists-of-america.org/constitution-of-the-conchologists-of-america-inc/>>).
- COA Trustee, Everett Long, has soldiered on in his role as *Neptunea* Award facilitator and your board selected two of the several nominees he presented: Paul Callomon and Ed Shuller & Jeannette Tysor, as the 2020 recipients. Details of their contributions to the operations of our organization and the advancement of its mission can be found elsewhere in this issue.
- Our Academic Awards Chair, Dr. Jann Vendetti, received roughly 45 applications for grant support from aspiring malacological researchers and will treat the 2019-2020 cycle of this vital program just like any other. Her report can be expected in the next (Sept.) issue of the journal.
- Last June, your Board created a new level of recognition for service to the organization, the Lifetime Achievement Award. Details of this honor are posted on the COA website. Doris Underwood is the inaugural winner and a vignette recounting her abiding manifold contributions to COA and to the advancement of conchology is presented on the following pages (5-6).
- Board Member-at-Large, Bruce Neville, who has spearheaded a year-long campaign to create an index for *American Conchologist* and its predecessor serials, will soon upgrade this vital resource by integrating the three chronologic segments into single inclusive sets in each of four categories, molluscan taxa, people and shell clubs, geography, and general topics. Access the indices at <<https://conchologists-of-america.org/american-conchologist-library/>>.
- *American Conchologist* Editor, Tom Eichhorst, approaching his 19th year at the helm, has been in communication with leadership at the Biodiversity Heritage Library, who indicate that our journal in its entirety (including predecessor COA serials), will be made available to the world's population in digital format. Our inclusive COA indices will leverage information retrieval from those pages (1974-present) to better serve the conchologically curious well into futurity.



COA President Harry G. Lee, MD

Thus we of the COA, while thrust into the midst of an awesome pandemic and stymied by the unprecedented cancellation of an event cherished by so many of us, keep our ambitions, stick to our mission, and sense that this, too, shall pass. Be safe, enjoy your hobby, and look to the future.

Harry

COA Lifetime Achievement Award

During the 2019 Captiva Island COA Convention, an idea for a COA Lifetime Achievement Award was presented, discussed, and approved. The specifics of this award can be found on the COA Web Site at: <https://conchologistsofamerica.org/the-coa-lifetime-achievement-award/> and are quoted here for convenience.

The Conchologists of America organization operates mainly with the support of volunteers as exemplified by the working board of directors. Each member of the COA board volunteers to take on one or more specific operational jobs contributing to the smooth operation of the whole organization. It is called a "Working Board." The proposed Lifetime Achievement Award is established to honor those COA board members who have served for [an] extended period of time in accomplishing significant leadership and operational tasks. Their sustained devotion to performing COA jobs have significantly contributed to the successful operation of the organization in one aspect or another.

- 1) The nominee of this award must have held in the past, [an] operational and/or leadership position on the COA Board of Directors for at least ten years; current board members are excluded from consideration.
- 2) It is the sole responsibility of the COA Board of Directors to select the award recipient. The process will be initiated by the COA president. The COA general membership will not participate in the process.
- 3) This single award, in the form of a plaque or statue, suitably worded, can be given no more frequently than every other year starting in 2020 and at the discretion of the presiding COA president.
- 4) This award may be given posthumously.

Adopted by the COA Board on June 19, 2019; posted to website April 29, 2020.

The recipient of the first COA Lifetime Achievement Award is **Doris Underwood**: member (and officer) of the Astronaut Trail Shell Club since 1975, member of COA since 1979, three-time convention chair, COA Vice-President in 1991, two-term COA President in 1992 and 1993, *Neptunea* Award honoree in 2003, and COA Membership Director from 1999 to 2014. Aside from her formal COA duties she staffed the oral auction payment table, donated more than her share of raffle prizes and auction items through the years, and was a strong supporter and contributor to the COA Academic Grants Program. The following article about Doris (p. 6) was written by Lynn Scheu in 1993 and is reprinted here.



Above: the first Conchologists of America Lifetime Achievement Award - presented to Doris Underwood, 2020. Thanks to our Awards Director, Vicky Wall.

Below: Doris Underwood at a recent oral auction payment table, laughing and keeping the mood light and lively. Thank you Doris for your years of service, but especially for your consistently upbeat attitude.



Spotlight on: Doris Underwood, COA President 1992-94

"Doris" means "born of the sea." What an appropriate name for Doris Underwood, newly reelected President of COA! Born on Long Island's South Shore, the infant Doris appears in baby pictures at water's edge, and she shares the same birthday (September 28) with COA's own "Mr. Seashell," Tucker Abbott (she points out he's nine years older!). A lifelong shell collector, she amassed her first collection, a wooden cigar box full, as a small child. "They were probably mostly bivalves, badly worn," she adds.

Life near the sea has always been a factor in her life. Growing up on Long Island, she moved with her family to Annapolis, Maryland in 1952, where they lived near the South River, again close to the water they all enjoyed. There wasn't much shelling to be done, but fossiling, rock hounding, and lots of boating and fishing kept Doris' spare time and interest occupied. In fact she was on a neighbor's boat for a fishing trip when she met Bill Thomas, whom she married a few months later.

Their honeymoon was to -- where else -- Florida, just the first of many trips to different parts of this water-bounded state. Travel, along with seawater, runs in Doris' blood. When she was a child, her father was a construction engineer whose work took him to many locations around the U.S.; Doris and her mother joined him summers and vacations. Doris says, "I've never lost the desire to see a new place." As newlyweds, Doris and Bill Thomas, another travel addict, started out with a travel trailer, but soon graduated to a motor home -- "more space to bring home shells and rocks." They also joined the Family Motor Coach Association, closing the circle of Doris' chief enthusiasms.

They moved to Florida upon Bill's retirement. First steps in their new home? They joined the Astronaut Trail Shell Club (she's a Survivor of the Sirenia -- ask her about that story), the Canaveral Gem and Mineral Society, and the Central Florida Roadrunners Chapter of the FMCA. "Travel was still a major interest for Bill and me," Doris maintains, "but shells took the forefront over rock hounding. With the many places to collect and the glorious scallop dumps of Cape Canaveral then available, we advanced from shoe boxes to wooden cabinets."

When Bill Thomas died in 1982, Doris immersed herself in her shells and in travel, remaining active in the Central Florida Roadrunners. She took up bridge and met her second husband, Bob Underwood, one of the bridge "pros" she played with. Of course, he'd have to be a travel lover as well, and when they married in 1986, Doris joked he'd married her for her motor home. They traveled around the world looking for shells for Doris, stamps for Bob. Australia

was next on their list, but, tragically, Bob died early this year. Doris says, "I miss him terribly. I feel so fortunate to have been blessed by two fine husbands. Bill and Bob were both my very best friends and companions."

Membership in COA since 1978 has brought increased involvement and interest in shells, in the Xenophoridae, to be precise. Doris still loves this family, and looks for specimens with unusual attachments. Her shell collection has expanded through the years, through trading, and through travel. One of her best trips was to Alaska where she acquired some *Arctomelon stearnsi*. Filling up a room in the loft, half the back bedroom and now the foyer closet, 27 cabinets, and dozens of plastic shoeboxes in the garage, she's still running out of space. She saves everything. After the Xenophoridae, she took on the popular Marginellidae, winning several COA and duPont Trophies. Recently, she's been concentrating on the Buccinidae and on limpets. And she's undertaken to catalogue her collection on the computer.



Another sidelight to Doris' career is her participation in COA. She did a spectacular job as one of the chairmen for the 1990 Melbourne Convention. (Small wonder! Doris was, before her retirement to Florida, a dynamic businesswoman, working until 1952 as a Commercial Representative for the New York Telephone Company, and then in the Personnel Division of Woodward and Lothrop in Washington, D.C. When she left the company after 21 years, she was Director of Employee Benefits.)

She brought her considerable talents to the COA Board of Directors the next year when she was elected Vice-President. After an active year working with the Club Representatives and an ongoing revision of the COA Constitution, Doris succeeded Glen Deuel as President in 1992. She spent much of her term, in spite of Bob's serious illness and worsening condition, at a revamping of the way COA works, aiming at making it a more effective and smother-running organization, and at bringing us up to standard in compliance with the Florida tax laws.

So dynamic was her leadership, yet always with an ear for problems, always with time for a small detail, that the 1992 Nominating Committee selected Doris to run for a second term. Only once before have we had a two term president -- Dick Forbush in 1983-85 -- but COA is an "equal opportunity employer" so it is fitting that the second such honor be accorded to a woman. And who more worthy than this capable Doris, lifelong sheller, traveler, business woman, and child of the sea.

[Scheu, L.] 1993. Spotlight on: Doris Underwood, *American Conchologist* 21(3): 10.

History matters: even to shellers

Alan Gettleman

Maybe your first experience with history was similar to mine: the obligatory high school class taught by a beloved coach. You felt this was his secondary job, necessary for him to coach, rather than teaching something of importance or interest.

An outcome of history is that which happens to you when you were planning something else. The current pandemic unfolding reminded me of 9-11. And 9-11 immediately called to mind the cold November afternoon when our teacher informed us President John F. Kennedy had been killed. And 9-11 had my mother immediately flashback to a cold December evening hearing on the radio that on December 7, 1941, the U.S. had been attacked at Pearl Harbor. Our recent pandemic is just another example of “déjà vu, all over again” as the great philosopher Yogi Berra noted. These seminal events not only immediately hit us “out of the blue” but make us recall previous history. And although painful, this realization helps us to put events beyond our control into perspective. We hopefully live and learn.

We note in our COA history that no convention has ever been canceled, even the second COA convention in 1974, when the fledgling group picked three different locations! The first was a hotel in Ft. Lauderdale, FL. Then it was decided to have the convention on a cruise ship going to the Bahamas. The cruise ship blew up, fortunately before the COA cruise. Finally it was decided for attendees to fly to a hotel in Freeport for the event, which they did.

The folks planning COA 20/20 have been diligently working on this convention since 2017. We had no earthly concept it would have to be canceled. What a year to volunteer to host COA!

Life changing events teach us many things. For most of us, life will go on. We will learn that we can weather this most recent challenge. Time helps us process this event and put it in perspective.

COA 20/20 will happen, making history by occurring a little later than first planned. The U.S. Space Program goes on with our international partners. The tides still ebb and flow on our sandy beaches. Mollusks go on with their lives unaffected. Australian member Hugh Morrison wrote he could not attend COA this year but concluded, “let’s plan for an even better convention next year.” And that will be the plan, when COA 20/20 convention moves to 2021. The convention theme COA 20/20 remains: a look back at a return to the future of human space flight from the U.S. and to a COA return to the Florida Space Coast. As of this writing NASA is planning its first launch of astronauts from the Kennedy Space Center in nine years, on May 27th. We hope

for a successful mission and many more prior to our next COA.

We look forward to seeing you all at COA 20/20, a bit late, in June 2021, in Melbourne, Florida, USA, on the Florida Space Coast. Please help those in need in your community as you can. Stay strong, stay healthy, and stay involved.

Those who remember high school history know there must be a test. Last year we mentioned in the annual history the first life time member of our organization was John Paduano, who founded COA. The historian found a second instance of COA conferring a life time membership. The test is to name that recipient. The answer is intuitively obvious and thus those who thought, “R. Tucker Abbott”, you are correct and passed the test. Congratulations.



COA Convention 2021 Melbourne, Florida

Field trips: June 14-15 (Monday - Tuesday)
Convention: June 16-20 (Wednesday - Friday)
Bourse: June 20 & 21 (Saturday - Sunday)

Mollusks of the night: a group of living mollusks that you may never see again: blackwater diving!

Charles E. Rawlings, M.D., J.D.

Leah M. Perez, MFA, Master Videographer

Everyone knows what a seashell looks like; most people have collected at least several during their lifetimes, and most people have eaten at least several including oysters, clams, mussels and even snails, or if you are truly adventurous, giant clams as sushi. Many people, especially in this group reading the COA journal, are avid collectors and know much about shells and their nuances. In fact, if you read this journal, you have seen many photos (including my own) of living seashells. Expanding into the true aficionados' interests, photos of living mollusks are of great significance. Mollusks include not only gastropods and bivalves (pelecypods) but also cephalopods (octopus, nautilus, cuttlefish and squid), nudibranchs, and several other unique, and often times, rare groups and species. It is this group of rare and unique mollusks that we shall discuss here. These living mollusks are ones that almost no one has seen and even fewer have photographed alive. Their shape, color and even texture are unique and in some cases mind-boggling. Be warned, however, these creatures are not seen or encountered on even routine dives; they are seen only rarely during a unique type of dive called a blackwater dive. This type of diving is not for the faint of heart; in fact, I have been called a lunatic for doing such a dive. Just so you know, I may be a lunatic, but I have done almost 100 blackwater dives and each has been a unique and often fascinating experience. Diving with my partner Leah Perez in Kona, Hawaii, proved to be exceptionally noteworthy. What follows is our account of four blackwater dives miles off the Kona Coast. This type of dive is absolutely not recommended for the faint of the heart or the non-expert diver.

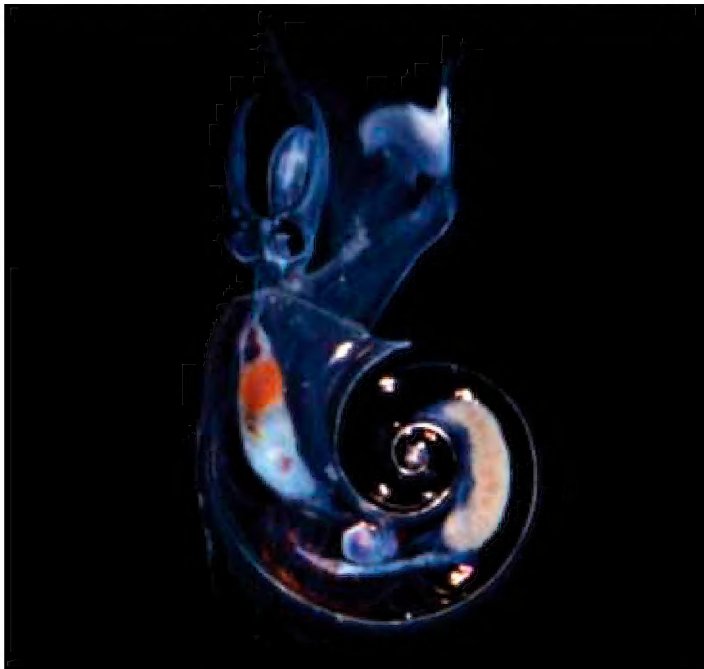
What is blackwater diving? Beginning in the 1980s, a group of intrepid divers decided to test the limits of open water diving. They invented what has become known as blackwater diving. One of the earliest well-known blackwater divers was the underwater photographer (and one of my mentors) Christopher Newbert. Chris would routinely venture miles off the Hawaiian Kona Coast at night to photograph rare and amazing creatures never seen before. He documented some of his finds in his famous book, *Within a Rainbow Sea* (1989). Chris would routinely dive alone to depths of around 150 feet, tethered to his boat. Since he was miles offshore, the bottom would be miles (yes, miles) below him. While never diving with Chris, I was able to

do my first blackwater dive in 1986 with Bonnie Sirena off Kona.

So what exactly is blackwater diving? It's pretty simple. You go several miles offshore where the depth is 5,000 to 15,000 feet, lower lights at various depths and jump in, hoping to photograph some of the weird life forms that migrate up from the abyss at night. These days, many dive locations and centers offer blackwater diving including Kona, Bali, Philippines, Florida, and Papua New Guinea. Not everyone uses the same method. Some operators place lights at various depths, usually 30 feet and 60 feet, and allow you to swim free. Some operators attach the lights to the boat, some attach them to a buoy. Other operators use few lights, but tether the divers to the boat by a 60 foot line, thus restricting your depth. I have done each of these, and I much prefer being untethered with the lights on a buoy. In Kona, however, we were tethered to the boat with 70 foot lines. So as not to be bothered by other divers, Leah and I booked the boat privately. Presented here are some of the creatures we found.

The night was pitch black as we boarded our dive boat, checked our gear, and settled into our seats for the 30 minute ride offshore. The moon had not yet risen, the sky was ablaze with stars, and a gentle wind had the sea whispering as we motored out. Thirty minutes later we stopped and we were about 7 miles offshore in water that registered past the 7,000 foot mark. The lights on shore were barely visible, and there was no sound except the lapping of the water on the boat. We had arrived at our "dive site"; one with no bottom or any other reference. The water was incredibly clear and the light had already begun to attract squid and flying fish. For this dive operator, blackwater diving entailed being attached to the boat by a 70 foot tether. Both Leah and I, however, had our private dive guides who would help spot and hold a light on any interesting subject so that we could focus and then photograph it. I was shooting stills with a Nikon D710 in an Ikelite housing with double strobes. I chose a 60 mm lens for depth of field and shot at F22; 1/125, and an ISO of 100. Leah was shooting video. We suited up, did a giant stride into the bottomless black ocean while holding the tether in our hands. At around 10 feet there was a line that ran from bow to stern; I was on the port side and Leah was on the starboard side. We clipped in and slowly drifted down to about 70 feet, and then it happened. The

blackwater became alive with living, pulsating, glowing, swimming objects ranging in size from about 3mm to a giant collection of salps (barrel-shaped, planktic tunicate), one of which was half the length of the boat, about 30 feet. The question had been: would we be able to find subjects? The question now was: could we photograph all of the interesting ones? Leah concentrated on videoing those with bizarre movements. I concentrated on the pelagic mollusks. I can barely describe the bizarre life forms we encountered during those two evenings. Hopefully these photos will suffice. Since this is the COA journal I will concentrate on the pelagic mollusks but have included photos of several other non-molluscan creatures which should interest everyone.



Atlanta peronii Lesueur, 1817, approx. 10 mm (shell length).

Probably the first mollusk I photographed was the pelagic snail *Atlanta peronii*. *Atlanta peronii* Lesueur, 1817, is a holoplanktonic marine gastropod in the family Atlantidae and can actually be recognized as a gastropod by its shell, one of the few pelagic mollusks we encountered that has a shell and could be recognized as a mollusk. Looking at the photo, one can recognize the apex on the right and umbilicus on the left. These mollusks can reach up to 11 mm in diameter and are found to depths of over 3,300 meters. The foot has evolved into a short swimming fin vital to their locomotion inasmuch as they are very active predators, locating their prey visually as evidenced by their prominent eyes. During the first night, we saw dozens of these gastropods.

During a blackwater dive, you are attracted to any solid colorful shape, since most of these creatures are transparent. It was not until I actually looked closely at my photos that I realized I had photographed a mollusk named

the sea elephant. The sea elephant (*Pterotrachea* sp.) is a holoplanktonic mollusk known as a heteropod (superfamily Pterotracheoidea), under the classification of the family Pterotracheidae, order Mesogastropoda, subclass Caenogastropoda. The sea elephant actually has a coiled shell during its larval stage, but this is absorbed during its maturation. The animal is virtually transparent except for its statocysts

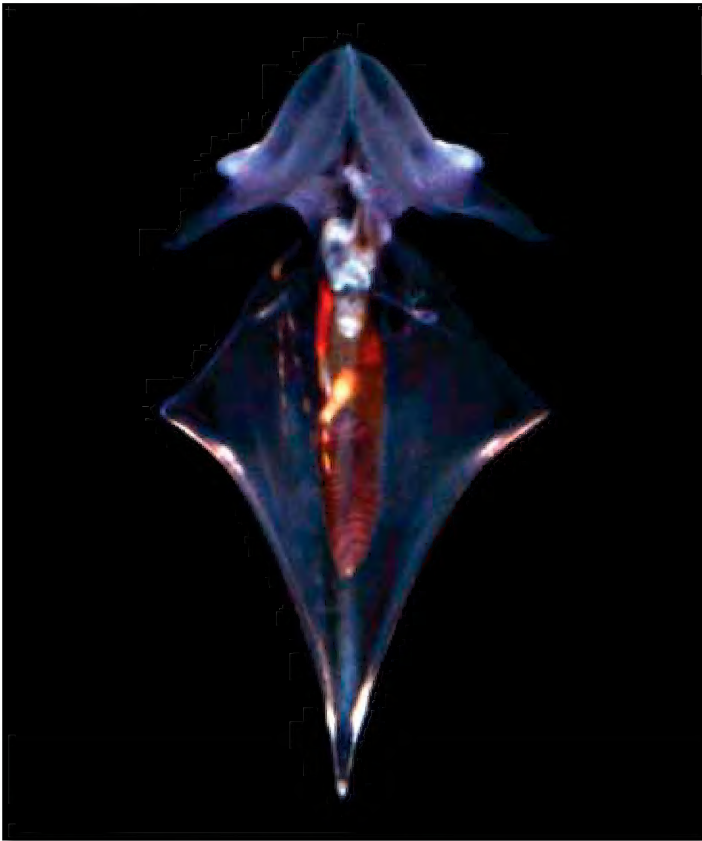


Above & below: sea elephants (*Pterotrachea* sp.) lack a shell, unlike the other two families (Atlantidae and Carinariidae) that make up the group Heteropoda. These active predators are also larger than other heteropods, some attaining lengths of 33 cm.



(balance sensory organs) and other internal organs. This mollusk is characterized by a mobile, extendable proboscis ending in a radula. This proboscis gives the animal its common name: sea elephant. Its maximum depth is around 300 m, and it swims ventral side up with two, large, paired eyes designed to aid in hunting its prey. These two photographs demonstrate all these features.

We were also lucky enough to find and photograph two different types of pteropods or sea angels. The first is probably in the genus *Cleone* and the second is probably *Cavolinia gibbosa* (d'Orbigny, 1830). Pteropod in Greek means 'wing-footed' and both of these animals demonstrate



A sea angel (*Cleone* sp.), once placed in Heteropoda, but now in the order Pteropoda, suborder (or clade, depending upon which authority you choose to read) Gymnosomata. These small predators begin life with a shell but shed their shell during metamorphosis.

this feature well. The foot has been modified into wing-like flapping appendages that allow for a relatively speedy locomotion. *Cleone* can reach speeds of 100 mm/sec (0.22 mph) which complicates their photography. These pteropods are highly carnivorous, feeding on each other and other pteropod species. Some are ambush hunters but the majority are active hunters, using their speed to hunt and consume their prey. Their maximum depth range is greater than 4,000 m, but the vast majority are found above 500 m. Pteropods are very common under sea ice and can grow to a fairly large size, up to 5 cm. All have larval shells, which are lost by maturity in gymnosomate pteropods but retained in thecosomate pteropods (e.g. *Cavolina* sp.). All are hermaphroditic, spring is their peak season, and all are at risk due to global ocean warming.

Speaking of the speed and quickness of the pteropods and their difficulty vis-à-vis photography, how do you photograph these small, transparent and, in some cases, quick animals? Typically it takes two people to obtain good photographs as well as a quick auto-focus camera and lens, a lens with a fairly short focus distance, and strobes that can be quickly manipulated so that the cone of light falls on the subject but not the backscatter or small particulate

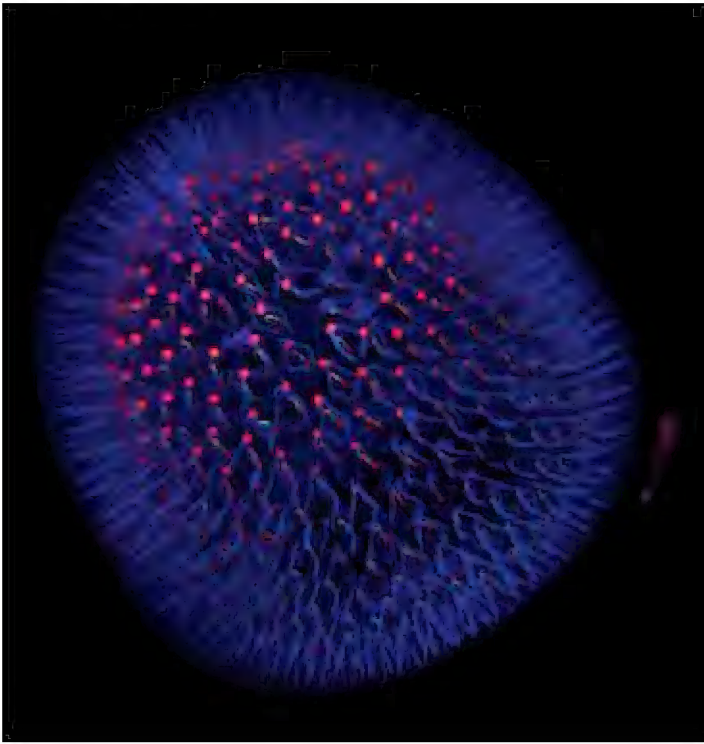


***Cavolinia gibbosa* (d'Orbigny, 1830) is a more commonly encountered pteropod. This shelled mollusk is in the order Pteropoda, suborder Euthecosomata, family Cavoliniidae. This small gastropod (about 10 mm) has an almost worldwide range.**

matter in the water. The first person acts as a spotter and when a particular animal subject is found, the spotter holds a focusing light on the subject allowing the photographer to have enough time to focus on the subject. It goes without saying that this is advanced diving where extraordinary buoyancy skills are mandatory. I typically am a touch negatively buoyant and slowly swim towards the subject while it is lit, beginning to take photos until it is too close for focusing; and then I start all over again. Typically the animal is transparent so you are actually focusing on its internal organs, which are solid and occasionally pigmented. Pyrosomes are much easier since they are larger and actually flash lights via their bioluminescence. Once I finish with a subject, I become the spotter for my partner. Leah, as a videographer, takes video in a similar manner but her video lights and Black Magic Camera are more sensitive so many times she was solo and didn't need a focusing spotter.

Having mentioned pyrosomes I have included a couple of photos of these amazing creatures, or actually a colony of creatures. A pyrosome is a collection of pelagic tunicates, free floating colonial tunicates that can reach lengths of 18 meters or more. The individuals are called zooids, and there can be hundreds to thousands of individuals in a colony. These tunicates are open at both ends so as to filter feed. They are planktonic but more specifically, they are bioluminescent and emit a beautiful blue green light in response to touch and light. This gives them the name of fire salps.

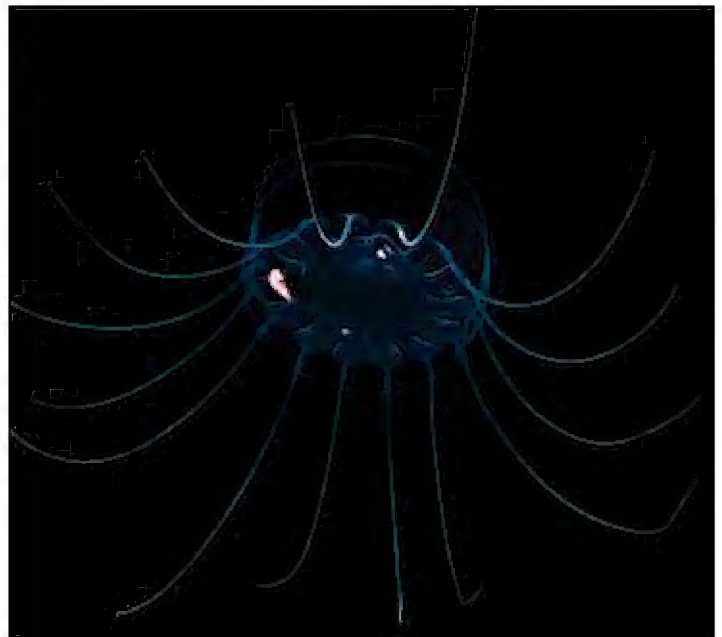
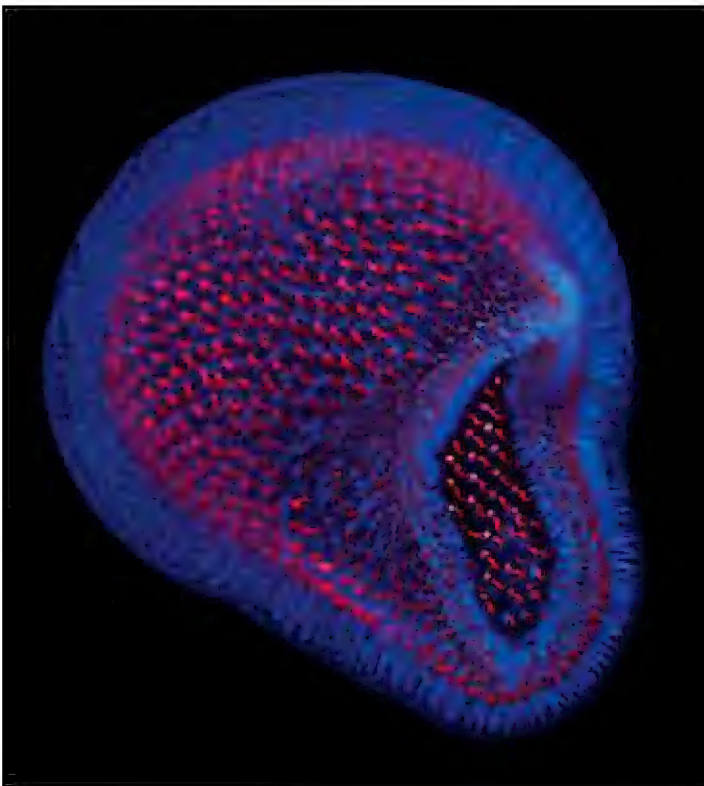
One of the most amazing mollusks we encountered is known as a pelagic nudibranch, most probably, *Phylliroe atlantica* (Bergh, 1871). There are two species of these pelagic nudibranchs, one in the Mediterranean and then *P. atlantica* in the Atlantic and Indo-Pacific. Both are voracious carnivores and extremely talented open ocean hunters. This creature is a perfect example of evolutionary convergence;



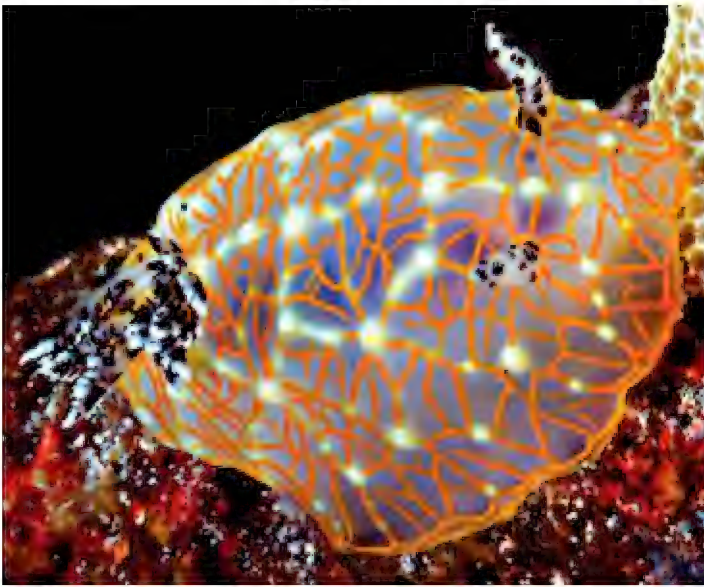
Above & below: pyrosomes, *Pyrosoma* sp., floating in camera range. These non-molluscan critters (phylum Chordata, class Thaliacea, order Pyrosomida) are made up of hundreds to thousands of individuals called zooids and, while planktonic (unable to swim), pyrosomes can maneuver via means of 'jet propulsion' using cilia inside the branchial basket. This process in reverse is used to draw in food (see below).



Phylliroe atlantica (Bergh, 1871) is one of two known species of pelagic nudibranchs. These small mollusks swim through the ocean like the fish they resemble, actively hunting jellyfish. As a juvenile of about 1.5 mm, *P. atlantica* attaches to the inside of the 'bell' of a hydromedusa and slowly devours the jelly. The nudibranch grows to 10 mm in as many days and can then finish off the jelly before swimming off to other prey.



The chosen prey of young *Phylliroe atlantica*, a hydromedusa, is the 'medusa' stage of a hydrozoan jelly (phylum Cnidaria, subphylum Medusozoa, class Hydrozoa; 'true jellyfish' on the other hand are in the classes Cubozoa, Scyphozoa, and Staurozoa). The Portuguese man o' war, *Physalia physalis* (Linnaeus, 1758) is a hydrozoan.



Halgerda terramtuensis Bertsch & Johnson 1982, or the gold lace nudibranch, endemic to Hawaii. While most of the 42+ species of *Halgerda* are found in the Indo-West Pacific Tropical region, two species are found in warm temperate waters of South Africa and Southern Australia and one species is from warm temperate Japanese waters.



Glossodoris rufomarginata (Bergh, 1890), or the white-margin or caramel nudibranch, found with the gold lace nudibranch. Note the egg mass.

resembling a fish in both body shape and movement. When you first spot this nudibranch, you definitely identify it as a small fish. Upon closer examination, you then notice the rhinophores and the parallel digestive system. Only then do you realize that it is not a fish. These nudibranchs can grow up to 5 cm in length and feed exclusively upon hydromedusae when young and then any jelly as an adult. They swim relentlessly in search of jellyfish and, when one is found, the nudibranch uses its paired rhinophores to capture the jelly. The nudibranch proceeds to slowly ingest the jelly beginning with the bell and ending with the tentacles, slurped up like spaghetti. I have also included a photo of one of these hydromedusae with a small krill trapped inside.

So as not to disappoint, we did do multiple day dives primarily exploring lava tubes at dive sites such as the Dome or the Outer Harbor. We found multiple living shells including the “*Cypraea*”: *C. tigris*, *C. arabica*, *C. carneola*, but none really interested me as a photo subject, especially after our blackwater dives. I was, however, able to photograph two interesting non-pelagic nudibranchs. One, *Halgerda terramtuensis* Bertsch & Johnson 1982, is also known as the gold lace nudibranch. This animal is endemic to Hawaii, and is actually limited to the lava tubes and rocky areas around Hawaii, especially Kona. The other nudibranch, *Glossodoris rufomarginata* (Bergh, 1890), commonly known as the white-margin or caramel nudibranch, was found in the same lava tube as the gold lace nudibranch. This species was on the ceiling of the tube and was laying eggs. The egg mass is clearly visible in my photograph. Both of these species are fairly common diurnal animals that

frequent rocky areas, especially lava tubes, in between 2 to 60 meters of water. Both are hermaphroditic and both feed on sponges. The caramel primarily eats a grayish sponge (*Cacospongia*) while the gold lace eats a light orange sponge which accounts for much of the nudibranch’s color. To a nudibranch lover like myself, these two species, especially the gold lace endemic nudibranch, were amazing finds.

In summary, Leah and I traveled to Kona, Hawaii, to undertake world class diving and to attempt to capture photographically the weird creatures of the pelagic abyss. Our blackwater diving was beyond anything we could imagine. Jumping into the black ocean, miles from land, with the bottom miles below was enough to excite even the most jaded diver. Moreover, being able to photograph these species of pelagic mollusks was simply amazing and introduced us to a world that is rarely seen or encountered by even seasoned divers. While blackwater diving is not for everyone, for those who are expert divers, it presents a unique opportunity to view rare and exotic species. Oh, and one more thing, I failed to mention the 16-foot tiger shark that came within 5 feet of us on our last two dives and followed us back to the boat. Unfortunately, I only had macro lens. Until next dive...

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Neptunea Awards for 2020

Everett Long



JEANNETTE TYSOR AND ED SHULER

In recent years COA had increasing difficulty finding clubs to host the COA convention and individual volunteers to do the myriad jobs necessary for a successful convention. Jeannette Tysor and Ed Shuler repeatedly stepped up and became one of COA's pillars of convention support. They served as co-chairs of one COA convention, de facto co-chairs of another, and are co-chairs of the 2023 event.

In this capacity they have done preliminary work on hotel selection, food menus and pricing, arrangements for field trips, suggested and arranged for special contests or activities as well as door prize and raffle items. They assisted with choosing logos and ordering materials for distribution to attendees. As an added benefit they were also instrumental in recruiting staff for all of these activities.

Jeannette served as treasurer for three conventions and will do so again in 2023. She is an advocate of using newer technology in accepting payment and made it possible for COA's Captiva Convention to accept credit cards at all venues requiring a financial transaction. She is particularly insistent on prompt final accounting after the convention and delivers her final report within a month.

Ed worked as the registration person for the Sanibel-Captiva Convention and will perform that duty again in 2023. He was also in the vanguard of indexers of the back issues of *American Conchologist*, a project that certainly positions COA in posterity with scientific and amateur malacologists.

Ed worked diligently to create and maintain a listing of "Record Size Shells" for North Carolina and participates in shell-measuring events during shell club meetings and regularly updates this important listing for the club.

COA is fortunate to have members with Ed's and Jeannette's skills and drive and would have had a difficult time the past several years without them and their willingness to spend the countless hours in planning and producing a COA convention.

Ed and Jeannette were jointly awarded the *Neptunea* Award for service to the Conchologists of America.



PAUL CALLOMON

As Collection Manager of the Malacology and General Invertebrates Section of the Academy of Natural Sciences (ANSP) of Drexel University in Philadelphia, Paul Callomon has supported COA in many ways, most



often helping us raise money for the COA Academic Award Program through his wit, quick mind, and amusing banter to obtain and maintain a large audience's interest for convention auctions. His depth of conchological knowledge allows Paul to relate an interesting historical tidbit or bit of arcane knowledge for just about every shell he holds in hand during the auction. He has also devoted many hours to nurture amateur shell collectors through his association with the Philadelphia Shell Club as well as other shell clubs.

Paul's knowledge of shells has him working shell shows all over the country as a scientific judge. He spends countless hours at shell shows with the exhibitors helping them improve their exhibits with his kind words and guidance. For years he was the driving force behind the Philadelphia Shell Show, a manifoldly daunting assignment.

Year after year you hear of Paul Callomon working with scientists and students, updating old collections and passing his knowledge along to others to help everyone to better understand the world of conchology through Conch-L, other social media, and personal contact.

He is an acknowledged authority on the history of science and the gastropod family Fasciolaridae, authoring or co-authoring many pivotal papers on these topics. Having spent some years in Japan and fluent in the language, he made sentinel contributions to the history of malacology in that country. His illumination of the rich heritage of the ANSP reached many COA members with his 2017 convention presentation and several articles in *American Conchologist*.

Paul was awarded the *Neptunea* Award for his service to the scientific interest of Conchologists of America.

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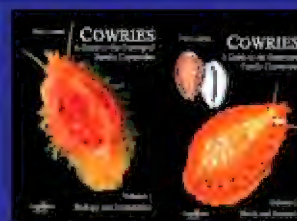
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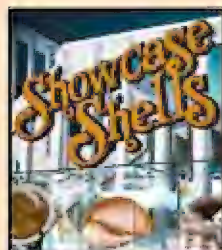
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The living species of the tulip shells: *Fasciolaria* and *Cinctura* (Gastropoda: Neogastropoda)

Allen Aigen

Introduction

This is an expanded and revised version of Aigen (2002), summarizing all living species of the closely related Fascioliinae (Superfamily Buccinoidea), genera *Fasciolaria* Lamarck, 1799, and *Cinctura* Hollister, 1957, over the Western Atlantic (including the Gulf of Mexico and Caribbean). A study of the fossil species will follow. This study separates the two genera I previously considered subgenera. Other major changes in this new publication are: 1) not using subspecific names (either I consider a population distinctive enough to be a species or I treat it as a variety, as per Rosenberg, Moretzsohn and Garcia, 2009, p.582); 2) increasing the number of living species covered from five to nine (six for *Fasciolaria*, three for *Cinctura*), and 3) relegating two more names to synonymy and restoring one.

These two genera (elevated from subgenera by Snyder, Vermeij and Lyons, 2012) of smooth to lightly sculpted, medium to large sized, fascioliine gastropods are popularly known as tulip shells. It is an exclusively Western Atlantic group comprised of nine named living species. Although most dwell in shallow, near-shore to offshore areas (less than 150 meters), there are at least two living bathyl species. Of the living species, three are now restricted to the Gulf of Mexico, and others are found from various Caribbean localities and from Brazil up to North Carolina. These are variable taxa, sometimes exhibiting greater apparent intraspecific than interspecific variation, both within and between local colonies, which may merge at the edges. Varietal names (synonymized valid epithets) help depict the wide range of morphology that some of the species exhibit, often essentially ecophenotypes.

The Gulf of Mexico has a relict fauna (Petuch, 1988). Species that went extinct elsewhere are found on the Campeche Banks and southwest of Florida, either unchanged or only slightly modified. *C. lilium* (Fisher, 1807), *Melongena bispinosa* (Philippi, 1844), and *Busycoarctum coarctatum* (Sowerby, 1825, are good examples. *F. bullisi* Lyons, 1972, may also be a relict species, but as very few deeper water faunas have been described from the Neogene, we do not know its history.

Note that both *Fasciolaria* and *Cinctura* species develop to a crawling stage in the egg case (generally as a 1½ whorl protoconch), and so spread mostly at the speed that they can crawl after hatching. Although there are two known living bathyl species (*F. tephрина* de Souza, 2002 and *F. delicatissima* Garcia, Lyons and Snyder, 2016) the

shallow water species like *F. tulipa* generally stay above 100 meters deep. They apparently can cross deeper water, like the Florida Straits (separating Florida from the Bahamas), by rafting on vegetation, especially during hurricanes, which can carry live *Fasciolaria* species, or their egg cases, west and north from island to island in the Caribbean, and from islands to the mainland. They are less likely to travel east or south across deep water, apparently restricting *Cinctura* species to the Gulf of Mexico and north to the Carolinas. During glacial periods, the sea level dropped about 200 meters, so the depth between the Bahamas and Florida was only about 250 meters; however, there are no colonies of *Cinctura* species known in the Caribbean.

Snyder, Vermeij and Lyons, 2012, redefined the genera in Fascioliinae, greatly increasing the number of genera, based on clear groups defined by multiple shared characteristics and biogeography. This also removed many species from *Fasciolaria* ss. For example, the South African *F. rutila* Watson, 1882, is now in *Africolaria*. *Murex lignarius* Linnaeus, 1758, a European species commonly misplaced in *Fasciolaria*, was shown to be in the subfamily Peristerniinae, genus *Tarantiaea*. Note that earlier common usage of *Fasciolaria* for West Atlantic species (living and fossil) also included species now variously placed in *Terebraspira*, *Triplofusus*, and the new genera *Pliculofusus*, *Aurantilaria*, and *Granolaria*.

In this (and in the study of the fossil species), I followed the World Register of Marine Species (WoRMS) and referred validly named deepwater (and distinct shallow water fossil forms) as varieties, with the exception of *C. branhamae* Rehder and Abbott, 1951. I treat them as subjective synonyms.

Materials and Methods

I will describe the living *Fasciolaria* and *Cinctura* species from my personal collection (AA), from the Paleontological Research Institution (PRI), and from published photographs and descriptions. Some of the shells are also represented as borrowed photographs. Note that the specimens are not the largest or most colorful, but representative and of scientific interest. Synonymy/chresynonymy is not intended to be comprehensive. The following species are listed in alphabetical order after their respective type species.

SYSTEMATIC DESCRIPTIONS

***Fasciolaria* Lamarck, 1799**

Type by monotypy: *Murex tulipa* Linnaeus, 1758.

Description (modified) from Snyder, Vermeij and Lyons, 2012: "Shell large to very large (up to 278 mm), broadly to elongate fusiform. Protoconch of one smooth, rounded whorl (variable in size) often inflated, followed by, usually, ½ whorl which is smooth to strongly axially ribbed. Early whorls either smooth or with spiral striae or cords, sometimes with various axial folds or nodes. Mature whorls generally, but not necessarily, with spiral striae, narrow or broad flat cords, uncommonly covering the entire teleoconch, often restricted to one or more subsutural crenulated cords (lacking in *F. bullisi*) and the siphonal canal, where angular to obsolete cords are generally present. Early teleoconch whorls are sometimes smooth. No axial sculpture (except growth lines and crenulations on the subsutural cord) is present on mature whorls (6th or greater). Aperture oval, slightly, to well-rounded or with a subsutural depressed area, creating a rounded shoulder and broad whorls. Shape can change with growth. Columella arcuate, glazed, with two (rarely three) strong, elongate and very oblique anterior plications, lowest one formed from the anterior edge of columella, second one strongest, generally offset with grooves in maturity. Siphonal canal open, usually straight to slightly twisted, no umbilicus. Spiral color lines numerous (four on earliest whorls), sometimes not visible, generally showing discontinuities at growth lines on mature whorls, forming denticles at mature outer lip. Fine spiral lirae generally present inside outer lip. Parietal area below suture may have a small bump; parietal inductura expands over whorl above lip, rarely covers entire whorl above the body whorl. Color may be grey, tan, greenish, yellow, orange, red or brown or ash grey, usually forming irregular flammules on a lighter colored background, with one or two lighter spiral band on the body whorl. Unicolor specimens may not show color lines, or these may be lighter than the background color. The protoconch is sometimes dark, and the early whorls may be unicolored tan, brown, red, or yellow, regardless of the mature whorl's color patterns. Operculum corneous, unguiculate with nucleus at the pointed anterior end. Periostacum thin. Mantle dark red to reddish-black with small white spots." Eggs laid in capsules attached to substrate in bunches, including eggs used for food by developing embryos, all development in capsule (Penchaszadeh and Paredes, 1996 — details from *F. hollisteri* but they also apply to *F. tulipa*.) Protoconch size varies within egg capsule depending on individual growth rate, although there is some distinction between species. Carnivorous, preying mostly on, clams, but also snails, worms and other invertebrates. (Wells, 1970). (Note: wedging open clams with the lip of the shell usually results in breakage until the lip is thickened in maturity.)

Radula long, flat, rachidian tooth small, lateral teeth long, comb like with many cusps.

The overall shape is useful for determining some of the species, however most of the species have variable, overlapping shapes within local populations, so the size and sculpture of the protoconch and early whorls is often critical, especially for immature specimens. Color lines structurally correspond with teeth on the mature outer lip and with spiral striae, although not all striae will show color lines, and color lines may be present without sculpture present. The color lines are often discontinuous at growth lines. The general color pattern most often seen in *Fasciolaria* species is colored flammules with light bands at mid whorl, at the base of the body whorl, and at the apical end of the siphonal canal. Some colonies commonly have unicolor shells. Early whorls may be dark, unicolored or with lighter body whorl with color restricted to flammules and lines.



Fig. 1 *Fasciolaria tulipa* Linnaeus 1758, 162 mm, 8-10 feet deep, off North Governor's Harbor, Eleuthera, Bahamas. Note shape, inner lip lirae and teeth colored by the spiral lines.

***F. tulipa* Linnaeus 1758 (Fig. 1)**

Murex tulipa Linnaeus, 1758, Systema naturae, ed. 10, p. 754, no. 489. Linnaeus, 1767, Systema naturae, ed. 12, p. 1223, no. 562.

?*Fasciolaria okeechobensis* Tucker and Wilson, 1932, p. 48, Pl. 1, fig. 6. Petuch, 1994, Pl. 52, fig. B.



Fig. 1a *F. tulipa*, 56 and 72 mm, protoconchs 2.1 and 3.7 mm, off Boca Raton, Florida, on coral reef, ~60 feet by scuba, 2004. Note weak post-protoconch sculpture.



Fig. 1b-1 *F. tulipa*, 180 mm, 25 feet deep, on rocky ledge off North Riding Rocks, San Salvador, Bahamas, 1985.

Fig. 1b-2 *F. tulipa*, 125 mm, Florida Keys. Knobs on 3rd and 4th whorl and lack of subsutural cord until 5th whorl.

Original description (12th edition): “M. testa ventricosta oblonga laevi, anfractibus rotundatis sutura geminata, apertura, uniplicata, cauda patule striata.”

Type locality: unknown.

Holotype: none, syntypes in the collection of the Linnaean Society, London (Dodge, 1957); lectotype: Designated by Snyder, Vermeij and Lyons as the drawing by A.J.D. d’Argenville, 1742, pl. 13, fig. K, although the type locality is unknown. It is impossible to tell the locality from the drawing, so a living lectotype still needs to be designated.

This is a variable species in terms of shape, surface sculpture, and color. The large number of synonyms for *F. tulipa* listed in Rosenberg’s (1995) Malacolog in part reflect the other two species in the *tulipa* group: *F. hollisteri* Weisbord, 1962 or *F. guyanensis* Lyons and Snyder, 2016, so I do not bother to list them here. The synonyms, however, reflect a part of the wide range of phenotypes of this widespread species group. They point out that the surface varies from heavily corded (*F. rugosa* Kobelt, 1875 and *F. scheepmakeri* Kobelt, 1875) to nearly smooth (*Neptunea laevigata* Link, 1807 and *F. obsoleta* Dall, 1890). It also varies from strongly, irregularly colored (e.g. *Colus marmoratus* and *C. achatinus* Röding 1798), to uniformly tan colored to brown (*F. concolor* Kobelt, 1875.) *F. canaliculata* Valenciennes, 1832, probably referred to the canaliculate *F. hollisteri*, but was mislabeled as coming from the Pacific and is essentially a *nomen nudum* unless the holotype can be located.

Description: Medium to large, broad and low spired to elongate, with an oval to rhomboidal body whorl, sometimes with strong or weak shoulders. Pleural angle generally between 50 to 76 degrees. One and one half whorl protoconch with last half whorl axially ribbed (sometimes almost obsolete and often not preserved in shallow water specimens.). Size of the protoconch varies within a colony (2.1 to 3.7mm in Fig. 1a). Early teleoconch whorls smooth or with up to three whorls of weak to strong axial and spiral sculpture, sometimes including nodes. Mature whorls usually with subsutural prominently crenulated cords and grooves in a slightly depressed area (variable in size and number with growth, within and between colonies), but often smooth for the first four whorls. Overall sculpture with sharp and narrow cords varying to broad flat or rounded cords with narrow striae becoming obsolete to smooth throughout growth; sharp cords, sometimes with smaller intermediate cords usually present on siphonal canal (sometimes weak.) Columella folds as in the genus. Parietal inductura variable, sometimes covering most of the early whorls.

Occurrence: *F. tulipa* is known from North Carolina to Panama, (including the Gulf of Mexico) and the northern Caribbean. The *F. tulipa* group also includes *F. hollisteri* which occurs in the Lesser Antilles and adjoining coastal Venezuela and Columbia and Panama (up to the canal), and *F. guyanensis* from Guyana to northeast Brazil. Both species were long incorrectly assumed to be part of *F. tulipa*.

Although a minimal sampling across its range may indicate that *F. tulipa* is a species complex, with very variable forms that overlap in most obvious characteristics, and vary in few less obvious ones, there are apparently no clearly distinct characteristics that do not appear in disparate areas, and no distinct group that does not merge at the edges (or even within colonies) with other forms. *F. tulipa* is a generalist, and will adapt to most prey (basically molluscan) and most substrates, ranging from intertidal to about 75 meters deep (Wells, 1970). Some colonies seem distinctive (like some in the Bahamas), which have wide shouldered forms with weak protoconch sculpture but they intergrade with more common forms (like narrow forms with stronger sculpture) that are also common in the Bahamas (Fig. 1b-1) Similar shouldered forms are common off the Yucatan Caribbean, and uncommon off Key West.

The Bahamas also include forms with noded early teleoconch ornamentation (generally on the third and fourth whorl), also found in Anguila and the Florida Keys (Fig. 1b-2). The heavily corded types common in Cuba are also found in northwest and southwest Florida where they intergrade with the common varieties. The number of subsutural cords varies within a colony, and increases with the number of whorls. Almost all areas include most of the color patterns, although frequency varies.

The bathyl depths between most Caribbean island groups effectively separated the various population groups during the Neogene. Even with low Ice Age sea levels, a depth range for *F. tulipa* of less than 100 meters was inadequate (by over 100 meters) to crawl between island groups (Lyons, 1972.) Therefore it can be assumed that separate island groups will have some distinct differences, but still may not be separate species as Tursch et al. (1998) controversially noted for Caribbean *Oliva* species. (If not 100% separate by morphology, are they the same species?) I hope a DNA or similar chemical study can be made to test this. Lyons and Snyder (2016: 5) hold out the possibility that other cryptic species, now considered to be *F. tulipa*, will be distinguished, but the work is yet to be done.

The *F. tulipa* group apparently has a very wide genotypic and phenotypic range, adaptable to a wide range of prey and substrates. The species that have been recently shown to be closely related to, but different from, *F. tulipa* (*F. hollisteri* and *F. guyanensis*) apparently were derived as southern extensions of the range and represent the founder effect, where a small distinctive group can form a distinct species. These are apparently nearly allopatric, found in



Fig. 1c *F. tulipa*, 106 mm, Campeche, Mexico. Variety *okeechobensis*. Note apical and subsutural sculpture.

separate but adjacent areas, and may not readily interbreed. (Note: there is apparently some overlap in Panama where *F. tulipa* is common in the San Blas Islands but *F. hollisteri* (q.v.) was found further north, near the Panama Canal.) *F. okeechobensis* was similarly an apparently distinct northern species in the middle Pleistocene of Florida. It represented a second wave of migrants crossing the Florida Straits, replacing *F. calusa* (Petuch, 1994) from the lower Pleistocene, which went extinct in Florida. *F. okeechobensis* was closely related to, and ultimately subsumed into, the general *F. tulipa* population by the late Pleistocene, with the possible exception of the Campeche relic population.

Campeche, Mexico, has a colony that is comparable to the typical extinct *F. okeechobensis*, with strong early teleoconch sculpture and most specimens with weak to strong spiral sculpture across most whorls (Fig. 1c). The parietal glaze is extensive over the upper whorls. This is likely a relic of middle Pleistocene Florida fauna. Because the separate characteristics that define the species are now widespread (although the combination of characteristics **may** now be restricted to the Campeche colony), I prefer to refer to this recent population as *F. tulipa* variety *okeechobensis*, until DNA or other chemical testing can show it to be distinctive. A specimen from San Blas, Panama, is nearly identical, also heavily ribbed, but lacks the early teleoconch ribs. A different specimen, also from San Blas, also lacks the early teleoconch ribs but is smooth. Specimens from No Name Cay, Abaco, Bahamas, are smooth but have post protoconch sculpture similar to that of *okeechobensis*. More sampling along the Campeche Bay would be needed to help clarify the status of this form. The fossil history of this and related species will be dealt with in detail in a separate article.



Fig. 2 *Fasciolaria bullisi* Lyons, 1972, 130mm, 525 feet deep, off Cabo Catoche, Yucatan, Mexico, 2005.

***F. bullisi* Lyons, 1972 (Fig. 2)**

Fasciolaria bullisi, Lyons, 1972, pg. 96, fig 1.

Fasciolaria (Cinctura) lilium subspecies or forma *bullisi*. Abbott, 1974, p. 228, Pl. 10, fig. 2505

Fasciolaria (C.) bullisi Lyons. Aigen, 2002, p 29.

Original description: "Shell thin, fusiform, slender; length/width ratio of the three unbroken specimens increasing with shell length from 2.62 to 2.87; largest specimen with nearly 8 whorls including nucleus; background color pale yellow with large patches of deeper yellow and orange. Embryonic whorls $1\frac{3}{4}$, first smooth except for two faint spiral threads on lower end (on unworn specimen), final $\frac{3}{4}$ whorl with 16-18 moderately strong axial riblets. First post-embryonic whorl with five incised, equidistant spiral lines, replaced by five thin brown bands on later whorls. Large specimens with 10-12 primary brown bands and 6-9 secondary bands on body whorl. Aperture ovo-elongate; outer lip thin, simple, finely lirate within. Columella straight to arcuate, with 2 shallow, oblique anterior plicae; siphonal canal long, slender, oblique of a rich amber, deepening to brown at tip. Operculum thick, corneous, ovo-elongate, attenuated obliquely at anterior end. Periostracum on dried specimens tan, very thin."

Type locality: 27 degrees, 37'N, 84 degrees, 13'W, 73 m.

Holotype: USNM 706880. Length 134.1 mm, width 46.8 mm.

Although Lyons' original description avoided placing this species in a subgenus, I had placed this distinct form in *Cinctura*, following Abbott (1974), based mainly on the lack of subsutural cording. That is the only thing that separates it from the rest of *Fasciolaria s.s.*, and may simply represent a neotenic retention of the smooth whorls that are the general rule for the first few post-protoconch whorls of *F. tulipa* and the extinct *F. calusa* Petuch, 1994. Snyder et al, 2012, also place it in *Fasciolaria s.s.* The color banding is consistent with *Fasciolaria* spp., and although offshore specimens of *C. hunteria* (G. Perry, 1811) and the extinct *C. evergladesensis* (Petuch, 1991) often add extra lines on the body whorl of large specimens, *F. bullisi* starts with five lines, unlike any *Cinctura* species. It also lacks the parietal subsutural cord which *Cinctura* is named for, and has a thin shell. It is from deep water, occurring in relict pockets (Petuch, 1998) off western Florida (holotype) and was also recently made available from north of the Yucatan Peninsula (Fig. 2). Note that this specimen shows faint spiral striae on the last $\frac{1}{4}$ whorl of axial ribs, so the protoconch may have only $\frac{1}{2}$ whorl of ribs followed by $\frac{1}{4}$ whorl of teleoconch ribs. Lyons (1972) reported it occurring with *F. hunteria* and *F. tulipa* at the deep edge of their range (73 m), and going down to 164 m. It probably evolved in the Middle or Late Pleistocene, possibly from *F. calusa* or *F. tulipa*, by retaining the lack of subsutural cords. Like deepwater forms of *F. tulipa*, which are commonly elongate, it has about a half whorl of axial cords on the protoconch and a long siphonal canal (but with obsolete cords.) Its characteristics suggesting *Cinctura* possibly reflect the relatively short time that the genera were separate. Couto et al. (2016:310, 314, 315) did some molecular phylogeny work on this species, showing it to be similar to, but distinct from, *F. tulipa*, but more detailed works need to be done to make a phylogenetic history of the group based on DNA (see Lyons and Snyder 2016:5.)



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Fig. 3 *Fasciolaria delicatissima* Garcia, Lyons and Snyder, 2016, 182 mm (L), 157 mm (R), north Cayos de San Andres, Caribbean Sea, Colombia. Note colored spiral lines; compare to *F. tephрина*. Image courtesy of Femorale.com.

***F. delicatissima* Garcia, Lyons and Snyder, 2016
(Fig. 3)**

Fasciolaria delicatissima Garcia, Lyons and Snyder, 2016, p.128, figs. 1-7.

Original description: “Shell large, up to 280 mm in length, 105 mm wide, fusiform, semi-glossy, with swollen, rounded whorls, and uncommonly thin walls. Protoconch white, large, approximately 3-5 to 4 mm, smooth with one whorl; first half of whorl rounded, second half swollen; protoconch axis not deviating from that of teleoconch. Teleoconch with 7 rounded whorls, first whorls shouldered to periphery, then straight; remaining whorls progressively more convex, body whorl swollen, globose. Suture deep, bordered anteriorly by a strong cord wrinkled by minute axial threads. Axial sculpture of numerous microscopic threads showing at start of teleoconch, approximately 30 on first whorl and 60 on second whorl; axial swelling appearing at periphery of second whorl, developing some 16 low nodes; nodes disappearing on later whorls; minute axial threads continuing on surface of shell through last whorl, becoming stronger on siphonal canal. Spiral sculpture subtly developing at beginning of first whorl, approximately eight strong threads showing on second whorl, 5 threads on shoulder, which will become strong cords on later whorls; three threads below periphery disappearing on later whorls;

spiral threads on early whorls creating a somewhat reticulate sculpture as they cross axial elements; two adapical threads strongest, wrinkled by axial elements. Siphonal canal straight or rather sinuous, long, approximately 30 to 35% of shell length. Aperture widely oval with many faint interior lirae best detected by running a fingernail or pin across the surface; width approximately 20 % of shell length. Parietal whorls smooth without callus; columella with two strong, oblique anterior plications, posterior one somewhat bifurcate; plications inconspicuously continuing as two or three long axial elements in different degrees of strength along dorsal side of siphonal canal. Outer lip thin, with five denticles at posterior end reflecting terminations of pre-sutural cords. Shell color off-white with uneven penciled-like brown spiral lines that terminate at beginning of siphonal canal and that show through to inside of aperture; columellar area and siphonal canal light tan, canal with sporadic dark brown blotches in mature specimens.”

Holotype: ANSP450737, 277 x 105 mm.

Type Locality: North of Cayos de San Andres, Caribbean Sea, Columbia, trawled, 350 m.

This newly described bathyl species is similar in shape and size to the other known deepwater Caribbean species: *F. tephрина* de Souza, 2002 (with which it had been confused); the early Pliocene *F. semistriata* Sowerby, 1850;

and the late Pliocene *F. leura* Woodring, 1928. It is distinct from *F. tephрина* in having strong spiral lines that are lacking in *F. tephрина*, more numerous post-protoconch axial lirae, and in lacking protoconch lirae. It has smoothly rounded whorls unlike *F. semistriata* and *F. leura*, both of which have a distinct flattened shelf and broad shoulder, forming broadly rounded stepped whorls. Living near the edge of the continental shelf off Honduras and Nicaragua, this species rarely comes to market. Specimens of *F. delicatissima* from Columbia (which owns many small islands off Nicaragua) have crowded brown lines on a grey or tan background.

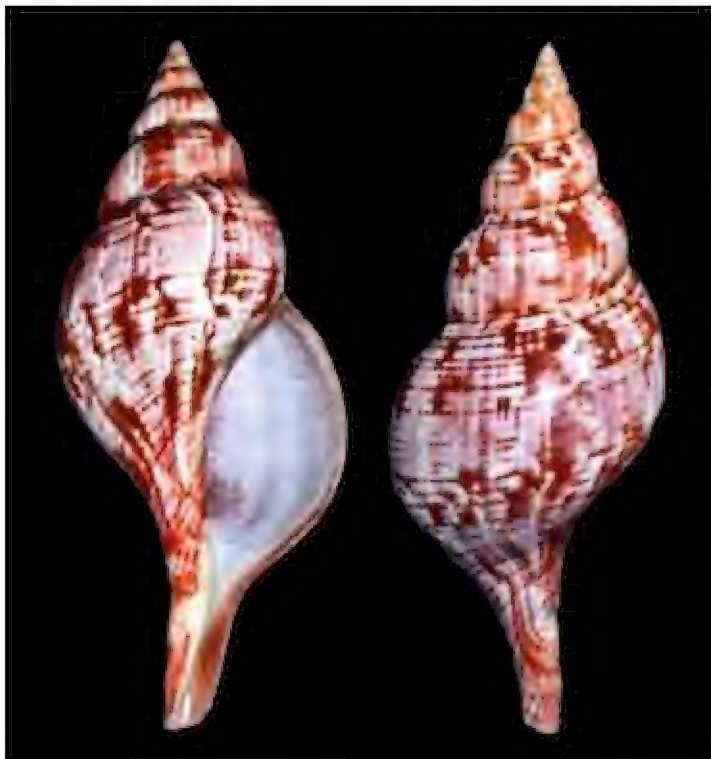


Fig. 4 *Fasciolaria guyanensis* Lyons and Snyder, 2016, 121 mm, French Guiana, trawled by fishing boats at 100 to 165 feet.

***F. guyanensis* Lyons and Snyder, 2016 (Fig. 4)**

Fasciolaria guyanensis Lyons and Snyder, 2016, p.1, figs. 1-4.

Original description: "Shell large, to ~250 mm, outline sub-bulbous, with tall spire, swollen body whorl, and moderately long, slender siphonal process. Protoconch of about 2 globose whorls, usually smooth but occasionally with few vestigial axial riblets near junction with teleoconch. Teleoconch with about 7 broadly convex whorls constricted at suture, with conspicuous anterior sutural ramp; first whorls bearing many microscopic spiral threads increasing by intercalation but fading in strength anteriorly, usually absent on later whorls; sutural ramp flexed with spiral cords appearing by third whorl; ramp of later whorls channeled by

3-5 rounded cords separated by shallow grooves; body whorl inflated, sub-globose, usually smooth (but see remarks), marked with spiral lines and bands, most interrupted but some complete on final ½ whorl, lines continuing onto base but disappearing on slender siphonal process. Aperture sub-ovate, constricted posteriorly; outer lip arcuate, slightly flexed at intersection with sutural ramp, forming shallow sinus at junction with parietal shield; edge of outer lip bearing small blackish brown or orange brown denticles representing termini of spiral bands of body whorl; inside of outer lip with many (>50) fine emergent lirae extending nearly to lip edge; parietal shield adherent, thin, glazed, sometimes with faint callus but no node near posterior end of aperture; columella concave with oblique folds (including entrance fold) near junction with siphonal process. Siphonal process straight, canted slightly left of long axis, smooth within with thin outer lip; inner lip slightly sinuous, glazed by extension of parietal shield, lip truncate. Operculum typical of genus, leaf-like, rounded posteriorly, tapered to point anteriorly, with terminal nucleus. Shell background color salmon pink, with 3 bands of irregular red, dark tan or orange-brown blotches on posterior portions of spire whorls; protoconch tan or light caramel brown; shell interior white."

Holotype: MNHN IM-2000-30193; 109.8mm.

Type locality: collected live off French Guiana (Guyane), depth 40 m.

This newly described species is the third described species in the living *tulipa* group, following *F. hollisteri*. It has the furthest southern range, known from Guyana, Suriname, French Guiana, and northeastern Brazil. It is the deepest dwelling, having been reported down to 118 meters deep. Although it ranges into the intertidal, it is mostly found offshore by shrimp trawlers. Like *F. hollisteri*, it has long been accepted as *F. tulipa* (e.g. Rios, 2009). Lyons and Snyder, 2016, trace it back to drawings from 1894, but those add little to the understanding of the species.

This species looks like an ordinary *F. tulipa* or *F. hollisteri* in its size, shape, coloration and sculpture, but there are critical differences. The most important is a rounded protoconch of two whorls (the first usually enlarged) mostly lacking axial cords. Note that both *F. tulipa* and *F. hollisteri* have 1½ whorl protoconchs, the second half with axial cords, although sometimes weak and difficult to discern, or worn or obsolete, as in the type specimen of *F. hollisteri*. The sutural ramp of *F. guyanensis* is plain, *F. hollisteri* is canaliculate, to a greater or lesser degree. The shell shape and details of the sutural collar of *F. hollisteri* are used by Lyons and Snyder to distinguish the new species, but like *F. tulipa*, *F. hollisteri* is more variable than they describe and the details are less significant thereby. For example, although usually short and somewhat squat, it can be elongate, or shouldered. Of the three species in the *F. tulipa* group, *F. guyanensis* is the least variable, probably because it was evolved last and

has a more continuous range, unlike the other two which are, in part, island dwellers with multiple, distinct, discontinuous populations.

The presence of a species from Brazil and nearby areas, distinct from similar northern Caribbean species, is becoming more commonly known as the southern faunas are studied (Lyons & Snyder, 2019). With *F. hollisteri* essentially separating the northern and southern populations of what was previously called *F. tulipa* from North Carolina to Brazil, it was clear that a distinct southern species was likely present, especially as there is no planktonic embryonic stage for easy dispersal. Based on both the known fossil record and paleogeography of the genus (dominated by Caribbean forms) *F. tulipa* is probably the oldest of the three sister species. *F. hollisteri* probably derived from *F. tulipa* during the early Pleistocene and *F. guyanensis* probably evolved soon after. Couto et al. (2016:310, 314.315) used nuclear and mitochondrial genes to compare specimens of *F. guyanensis* from French Guiana, *F. tulipa* from Guadeloupe, and *F. bullisi* from Florida. Lyons and Snyder (206: 5) reported that Dr. G. Rosenberg determined that divergences between them are similar to those seen with other closely related species. They expect similar results when *F. hollisteri* is compared.



Fig. 5a *Fasciolaria hollisteri* Weisbord, 1962, 92 mm, shell dumps near mangroves, Margarita Island, Venezuela (note the white spiral lines).

***F. hollisteri* Weisbord, 1962 (Fig. 5)**

Fasciolaria hollisteri Weisbord, 1962, p. 351, Pl. 31, figs. 1, 2. P Gibson-Smith, J. and W. Gibson-Smith, 1979, p.24. Petuch, 1988, p.157, Pl 37, figs. 11, 12.

Fasciolaria tulipa hollisteri Weisbord. WoRMS (2010). In:

Bouchet, P.; Gofas, S.; Rosenberg, G. (2010) World Marine Mollusca database. Accessed through: World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdetails&id=448536> on 2012-02-13

Original description: “Shell large, generally ovate in outline, the angle of spire around 61 degrees, the apex obtuse. Whorls about eight, including the nucleus. Nucleus hyaline, consisting of 1-1/2 whorls, the initial small and appressed, the last rapidly expanding, merging insensibly into the conch which is porcelaneous. Post-nuclear whorls convex, the body whorl well rounded. Sutures canaliculated, somewhat gaping. Around the summit of the whorls there is a slight thickening or collar at the suture, the collar rendered rugose or crenate by fine axial grooves and numerous growth striae. Below the sutural collar is another strong spiral fillet, this about half as wide as the collar and separated from it by a deep groove, the fillet in turn separated from the shoulder area by another prominent groove. Remaining area of body marked with faint spiral bands between fine spiral grooves, these markings much closer together on the base than they are on the shoulder and on the convexity. Surface covered with longitudinal sinuous growth striae, the striae building up into incrementals on the back of the anterior canal. Aperture proper ovate, lined with about 82 closely spaced subequal lirae, the lirae terminating irregularly but abruptly some distance from the edge of the outer lip. Between the termini of the lirae and the rim of the outer lip the apertural margin is smooth. Outer lip thin, the inner margin along the rim bearing about 29 denticles which project into points above the rim, the denticles extending from the posterior outlet to the entrance of the siphonal canal. The denticles of the lip and the lirae of the aperture are brownish, the interspaces more or less whitish. Columella arcuate, the base with three low, oblique folds, the middle one of which is the most elevated, the lowest one the broadest and forming the margin of the pillar, the uppermost one the feeblest. Siphonal canal of moderate length, wide, curved a little upward anteriorly, the extremity shallowly notched. Labium with a glaze of tan enamel extending from the pillar to the parietal wall, the margin of the glaze neatly and clearly defined from the egg-white surface of the whorl, the glaze encircling the base of each proceeding whorl, becoming less and less wide above the suture until, near the tip of the spire, the glaze is entirely concealed by the suture. Posterior outlet marked by a subtriangular arch, the groove of the posterior siphon margined below by a broad low ridge of callus which does not extend across the parietal wall.”

Holotype: PRI #26255; “158 mm; max. width 74 mm; length of aperture and canal 104.5 mm; width of siphonal canal at anterior end 9 mm.”

Type locality: “Lower Mare formation, in small stream 100 meters west of Quedbrada Mare Abajo [Venezuela.]”



Fig. 5b *Fasciolaria hollisteri*, 129 mm, Spanish Lagoon, shallow water, Aruba.

Petuch (1988) considered this a member of the early Pleistocene Cabo Blanco Formation. Gibson-Smith (1979:18) considered it questionably late Pliocene. Although named as a fossil, it is essentially known to the public only from Recent specimens. It occurs from Colon, Panama (specimen from Natural History Museum, Rotterdam NMR 97276 (where it coexists with *F. tulipa*) across the southern Caribbean of Columbia and Venezuela, and the Lesser Antilles (**Fig. 5b**). It is coeval with *F. tulipa* during the Pleistocene and probably evolved from *F. tulipa*.

Distinct in having a channeled suture, having weak or no protoconch ribs, weak to obsolete cords on the siphonal canal, and a single to doubled subsutural cord, this form shows a wide amount of variation in the Recent between colonies (especially between islands.) The colony at Margarita Island, Venezuela (**Fig. 5a**), (which has been commonly sampled from the area's shell dumps), is distinctive in having the weakest canaliculate suture, very weak protoconch ribs (generally not preserved), and mostly unicolored brown, tan or yellow shells (characteristic of the mangrove swamp dwellers). Overall the range of shapes, colors and color patterns is very similar to the probable parent species, *F. tulipa*.

This form was considered a subspecies, at best, by most workers for a long time, however WoRMS now considers it a valid species. Weisbord compared it to a Florida specimen of *F. tulipa* in his description and based the new name on the apparent lack of protoconch axial cords and the presumed Pliocene age.



Fig. 6 *Fasciolaria tephрина* de Souza, 2002, 220 mm, near Honduras-Nicaragua border, in fish trap, 300 m, plain white, like the holotype. Image courtesy of Femorale.com.

***F. tephрина* de Souza, 2002 (Fig. 6)**

Fasciolaria tephрина de Souza, 2002 p1-7, figs. 1-5.

Fasciolaria tephрина Garcia, Lyons and Snyder, 2016, fig. 10-13.

Fasciolaria cf. tephрина Garcia, Lyons and Snyder, 2016, fig. 14-16.

Original description: "Shell large, fusiform, spire high. Surface somewhat glossy, ashen white in color, marked with axial growth lines, sculpted by 4 or 5 spiral grooves on concave area just anterior to suture. Protoconch large (approximately 5.5 mm in height), paucispiral, deviated, rounded with one whorl. Teleoconch with 7 highly convex whorls, early whorls with obsolete wide ribs (10 on first whorl) and 4 spiral cords, gradually fading, disappearing at 4th whorl; very faint spiral grooves appearing on the final third of body whorl. Aperture slightly prosocline posteriorly, otherwise orthocline, rounded, wide, internally glossy with cream colored enamel; outer wall with numerous, thin, weak lirae; outer lip unthickened with 6 weak, posteriorly set denticles. Parietal wall smooth; columella with 2 moderately strong, oblique plications, not apparent at aperture; anteriormost plication blending with the inner lip

of siphonal canal. Siphonal canal very long (24.6% of total shell length), open, slightly sinuous.”

Holotype: MZSP 35048 (length 187.4 mm, width 73.8mm).

Type Locality: North of Quita Sueno Bank, Columbia (off Nicaragua) 14 40' n 81 25' w, 480 m, viii.1957. Paratype MNRJ 8668 (length 160.1mm, width 70.9 mm) has a missing protoconch and the a partially broken siphonal canal. Other material: off Roatan Island, Honduras, 420 m, (length 155mm, width 68.4 mm)”

Garcia, Lyons and Snyder (2016) revised the description of *F. tephрина* by adding a variety: *F. cf. tephрина*, which has brown blotches on the shell. Note that the position of the brown blotches (subsutural, below the mid whorl, at the base of the whorl and the base of the siphonal canal) is consistent with the position of the color flammules in other *F.* species. Although there was speculation that the poor preservation of the outer shell layer of the holotype (William Lyons, personal communication, 2012) led to the ash grey color (distinct for the species), the better preserved specimen is plain white. Thus the poor preservation did not remove color, but the roughened surface looks grey. The specimens with brown blotches have the same white base color and do not otherwise differ from the original description except in having a weaker parietal shield.

Although not mentioned in the original description or in that of the brown splotched variety, the photos in Garcia et al. of the better preserved protoconchs of *F. cf. tephрина*, show that there is a relatively large first bulbous whorl followed by a less prominent second whorl, which apparently has faint axial striae at the sutural border for at least the first half. Note that the excessively large first whorl apparently causes the appearance of a “deviated” protoconch. Also the “obsolete wide ribs” of the original description can be fairly sharp, cut with strong spiral lirae, forming two nodes on each rib of the early teleoconch.

This species was caught in fish traps off the edge of the continental shelf (ranging from 400 to 500 meters deep) bordering the Caribbean coasts of Honduras and Nicaragua. This area of rugged and complex topography lends itself to the development of small allopatric populations in species with direct development like *Fasciolaria* (Garcia et al., 2016, p 131)). For another species from this general area, see *F. delicatissima* Garcia, Lyons and Snyder, 2016, described above. I consider both to be probable descendants of the late Pliocene *F. leura* (Woodring, 1928).

Elongated, as are deepwater forms in general, this species has an exaggerated depressed subsutural area, which causes the whorls to be convex. The subsutural spiral grooves are present but weak. The deviated protoconch and lack of color are similar to a South African species *Africolaria rutila* (Watson, 1882). This shell may have more in common due to the similar bathyl environment than to the phylogeny. *A. rutila* lacks the color lines and teeth

and evolved separately, although from similar fasciolarine stock, which is worldwide.

***Cinctura* Hollister, 1957**

Shells small to medium size (up to 140 mm), fusiform, varying from slender to broad (often within a species) with smooth to nearly smooth mature whorls (one extinct species with sutural thickening and one subsutural cord). Shell relatively thick compared to most *Fasciolaria* species. Color lines prominent, generally strong and few. Color pattern generally of flammules on the body whorl, with light colored spiral areas on the center and near the base of the body whorl. Periostracum thin and dull green. Most species with a parietal cord; parietal inductura restricted to the area in front of the aperture, and with a definite edge. Because color lines on the body whorl vary within species (often increasing in number with maturity), the number and position of lines on the apical whorls are more diagnostic, and when preserved are two or three and are continuous. *Fasciolaria* spp. generally have four or more discontinuous lines.

All three current species occur in the Gulf of Mexico and *C. hunteria* also ranges up the coast to North Carolina. Although *Cinctura* was characterized by Hollister (1957) by the cord on the parietal wall just below the suture, not all species of this genus have one, and not all members of *Fasciolaria* lack one. These are smooth forms, without subsutural cords (except for the extinct *C. monocingulata* (Dall, 1890) and without sculpture (except spiral cords on the siphonal canal) in maturity, although apical (protoconch and early teleoconch) sculpture may appear strong on immature specimens. Protoconch sculpture, or its lack, is generally consistent within species, but early teleoconch sculpture may vary between and even within populations.

Although the *Cinctura* species will occur in the same general area as *F. tulipa*, they segregate by diet — *Cinctura* eating smaller invertebrates (varied shallow water forms, often found near oyster beds), *F. tulipa* eating mostly clams that burrow in sand and mud, but all will scavenge when available (Wells, 1970).

Because the living *Cinctura* species all occur together in the Gulf of Mexico and often cause confusion, I include a simple way to distinguish them, depending, however, mostly on the sculpture of the protoconch. The simplest species is *C. hunteria* (G. Perry, 1811), with no protoconch sculpture (variety *tortugana* has early teleoconch sculpture) and a short siphonal canal. *C. lilium* (Fisher, 1807) has axial ribs on the protoconch, both axial and spiral cords on the first teleoconch whorl and a more elongate siphonal canal. *C. branhamae* (Rehder and Abbott, 1951), has the same mix of sculpture as *C. lilium*, but is a larger, more globose species with a lighter background color, more spiral color lines and an obviously elongate, narrow siphonal canal. If you have a Gulf shell with no protoconch ribs, many spiral lines and it

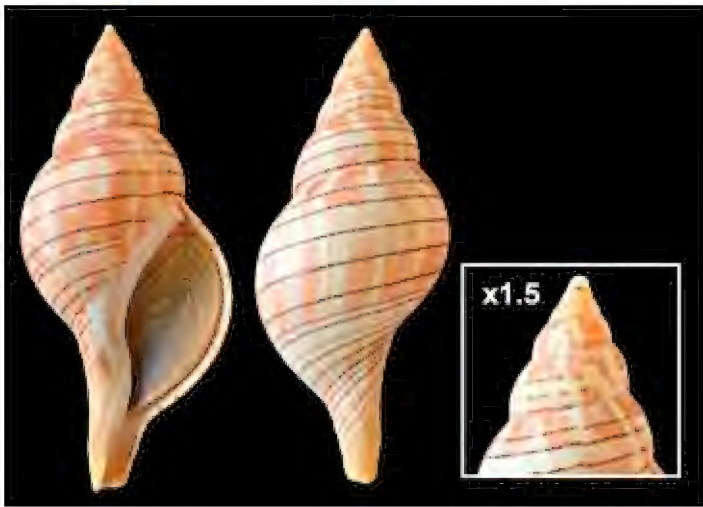


Fig. 7a *Cinctura lilium* (Fisher, 1807), 98 mm, dredged by shrimpers at 180-200 feet on sand, Dry Tortugas, Florida, 2003. Note sculpture on protoconch and early teleoconch, three lines on upper whorls.

looks like a narrow *F. tulipa*, but lacks the subsutural cords, see *F. bullisi*, above.

***C. lilium* (Fisher, 1807) (Fig. 7a)**

Fasciolaria lilium Fischer von Waldheim, 1807.

Fasciolaria (Cinctura) lilium. Hollister, 1957, p. 76, Pl. 6, figs. 1, 3-5. Vokes and Vokes, Pl.16, fig. 8.

Fasciolaria (Cinctura) lilium lilium. Abbott, 1974, p. 228, Pl. 10, fig. 2501. Aigen, 2002, p. 21.

Fasciolaria distans Lamarck, 1822.

Original description: “Fasciolarie lys, venture, oblongue, unie; les tours de spire arrondise; la suture simple, la queue courts et lisse.

“*Fasciolaria lilium*, mihi, elle est blanche, et couverte de lignes transversals, rares, brunes. Buccinum rostratum ponderosum leave lineis raris rufis circumdatum. Lister t. 910”

Holotype: apparently lost. Lectotype: designated by Hollister, Sloane Cat. No. 1481 BMNH, from Campeche, Mexico.

Type Locality: The name bearer of the genus is from shallow water at Campeche, Mexico. Although named in 1807, the name was ignored and the shell assumed to be identical to the more common *C. hunteria* (which was known as *distans*.) See Hollister (1957) for the history. Common on the Campeche Bank, it possibly also occurs offshore in Texas (Hollister, 1957) and has been dredged by shrimpers at 200 feet off southwest Florida (**Fig. 7a**). A distinct, unnamed variety occurs in Laguna Madre, behind South Pedro Island, near Brownsville, at the southern tip of Texas (**Fig. 7b**). Note that this shallow water variety often has the early whorls poorly preserved, making it distinguishable



Fig. 7b *Cinctura lilium*, 75 mm, beach, south end of Laguna Madre, South Padre Island, Port Isabel, Texas. Note apical sculpture and elongate siphonal canal, but only two lines on early whorls.

from *C. hunteria* only by having a slightly longer, narrower siphonal canal.

It is superficially like *C. hunteria*, the common Gulf of Mexico to North Carolina species. *C. lilium* has a longer, more narrow siphonal canal, axial ribs on the protoconch, often both axial ribs and spiral cords for one or more whorls on the teleoconch, and usually three (rather than two) evenly spaced color lines on the upper whorls (generally not clear until the fifth whorl.) Specimens from Laguna Madre, South Padre Island, Texas, have only two lines (**Fig. 7b**). It gets elongate in deeper water, as do deepwater forms of *C. hunteria*, (varieties *tortugana* and *keatanorum*) but it does not attain the proportions of its daughter species, *C. branhamae*. *C. lilium* is not known as a fossil in Florida, but it is only little different from *C. apicina* (Dall, 1890), a common shell from the Pleistocene Caloosahatchee of Florida and coeval formations up to North Carolina. It most likely migrated to the relatively warm waters of offshore, southwest Florida and the Campeche Banks during or at the end of the early Pleistocene. Note that it has both a smoothly rounded profile and a white parietal area unlike the small subsutural shelf and dark parietal area of typical *C. apicina*.



Fig. 8 *Cinctura branhamae* (Rehder and Abbott, 1951), 106 mm, trawled by fishermen at 250 feet, muddy sand, offshore Campeche Bank, 1980. Note three lines on early whorls, elongate siphonal canal.

***C. branhamae* (Rehder and Abbott, 1951)**

Fasciolaria distans branhamae Rehder and Abbott, 1951, Pl. 6, figs. 4-5.

Fasciolaria (Cinctura) branhamae. Hollister, 1957, p. 80, Pl. 6, figs. 6-8.

Fasciolaria (Cinctura) lilium subspecies or forma *branhamae*. Abbott, 1974, p. 228, Pl. 10, fig. 2503.

Fasciolaria (Cinctura) lilium lilium Fisher. Aigen, 2002, p. 21.

Original description: “Resembling the typical *distans* (Lamarck) [= *F. hunteria*] but differing in having its siphonal canal two or three times as long and proportionately more slender. The first whorl of the protoconch is smooth, and is followed by $\frac{3}{4}$ of a whorl with about 15 small but distinct axial riblets. This is followed by $\frac{3}{4}$ of the first postnuclear whorl with about 5 indistinct spiral threads. The remainder of the postnuclear whorls are smooth except for microscopic growth lines. In *distans* these nuclear axial riblets are nearly obsolete or entirely absent. Color of shell similar to that in *distans* but with an orange-brown siphonal canal. There are 9 to 12 distinct solid spiral lines of dark purple-brown on the body whorl, with the lower 2 or 3 on the upper third of the siphonal canal. In *distans* there are 5 to 7 major lines, occasionally with 1 or 2 additional very weak

lines, and they do not extend down on the siphonal canal. The spiral threads on the siphonal canal in *branhamae* are quite weak or obsolete, while in *distans* they are pronounced. An 8 whorled *branhamae* reached a length of 125 mm while *distans* with the same number of whorls range from 70 to 90 mm.”

Holotype: USNM 597513, [126 mm].

Type Locality: Tabasco, Mexico off Puerto Alvaro Obregon [no depth noted, dredged by shrimp, 1951.]

Rehder and Abbot described the holotype as having $\frac{3}{4}$ of a whorl of protoconch ribs and no post-protoconch axial structure, unlike the typical $1\frac{1}{2}$ whorled protoconch with the last $\frac{1}{2}$ whorl of axial ribs. The holotype is not well enough preserved, but another specimen in the USNM showed that the last $\frac{1}{4}$ whorl is cut by spiral striae (correspondence from Ellen Strong, Research Zoologist at the Smithsonian, 2/26/2020). Similarly, a specimen from offshore Campeche Bank (Gulf of Mexico, extending from the Yucatan Straits in the east to the Tabasco-Campeche Basin in the west, **Fig. 8**), has only $\frac{1}{2}$ of a whorl of axial riblets on the protoconch following a smooth whorl, but also has post-protoconch sculpture consisting of axial ribs cut by fine spiral striae for most of the rest of the second whorl, followed by about 5 spiral striae with some white axial bumps for another whorl. Apparently, because the holotype has a slightly worn spire, the spiral cut axial ribs were assumed to be part of the protoconch rather than early teleoconch. This shows that *C. branhamae* is closer to *C. lilium*, as the protoconch sculpture is not very variable within *Cinctura* (as compared to the sculpture on post-protoconch whorls.)

It is more elongate, with a longer siphonal canal than *C. lilium*. This form was named as a subspecies of *C. distans* (generally = *C. hunteria* but includes *C. lilium* in Rehder and Abbott, 1951) because the earlier named species, *C. lilium*, was overlooked. Note that Rehder and Abbot, 1951, compared *branhamae* to *hunteria* from North Carolina, and apparently, when examining Gulf of Mexico specimens of *C. lilium*, they assumed them to be intermediates, thus the subspecies designation. *C. branhamae* is considered a separate species on Rosenberg’s database as it was considered to be living in the same area as *C. lilium*. Apparently *C. branhamae* is not simply a deepwater form or variety of *C. lilium*, as I unfortunately described it in 2002. I have a 98 mm specimen of *C. lilium* (**Fig. 7a**) from 180-200 feet caught by shrimpers near the Dry Tortugas. Although longer than the typical shallow water form, it is not relatively large (for the number of whorls) and elongate as is *C. branhamae*, nor relatively pale, as is that deepwater species. Clearly simply being from deep water does not cause *C. lilium* to assume the *C. branhamae* form. K. and L. Sunderland (1999) have a useful series of *Cinctura* (and *Fasciolaria*) pictures. A typical *C. branhamae* (labeled *F. lilium branhamae*), is 134 mm, fished from 120 feet deep by shrimpers off Yucatan,

Mexico. Compare it to a similar, smaller shell at 125 mm (labeled *F. lilium lilum*) from 40 feet deep off Brownsville, Texas (apparently from the Gulf side of South Madre Island as it has 3 spiral lines on the upper whorls). More colorful than the larger, deeperwater *C. branhamae* it has a similar shape but a wider, less elongate siphonal canal. Clearly different are the short, broad canals of *C. hunteria* and its varieties *keatonorum* and *tortugana*.

Note that although this species generally shows a very light colored background, the flammules (although often very pale) are similar to those of *C. lilium*, its apparent ancestor, from which it evolved during the Pleistocene. This species is not restricted to the relict areas of the Yucatan Campeche Bank and offshore southwest Florida like *C. lilium* and *F. bullisi*, but rather it spread north to Texas.



Fig. 9a *Cinctura hunteria* (G. Perry, 1811), two submature shallow water specimens from Florida, 59.5 mm and 59 mm, showing variations in color, shape, and line patterns. Note cincture on inner lip just below suture.

***C. hunteria* (G. Perry, 1811) (Fig. 9a)**

Pyrula hunteria G. Perry, 1811, Conch., p. 50, no. 4, fig 4.
Fasciolaria distans Reeve, 1847 Conch. Icon., vol. 4, Mon. *Fasciolaria*, p. 4, figs. 10a, 10b (non Lamarck, 1822).
Fasciolaria (Cinctura) hunteria. Hollister, 1957, p. 82, Pl. 6, figs. 2, 11-13. Aigen 2002, p23.
Fasciolaria (Cinctura) lilium tortugana Hollister, 1957, p. 79, Pl. 6, figs. 9-10.
Fasciolaria (Cinctura) lilium subspecies or forma *tortugana* Hollister. Abbott, 1974, p. 228, Pl. 10, fig. 2504.
Fasciolaria (Cinctura) lilium hunteria. Abbott, 1974, p. 228, Pl. 10, fig. 2502. Aigen, 2002, p.23.
Cinctura hunteria keatonorum Petuch, 2013, p.203, fig. 3.6D.

Original description: “Shells of a blue and purple color, richly marbled and striped with white and black, forming in the whole a rich and lively appearance; the mouth, blue.”

Type Locality: The type locality (no holotype) was incorrectly stated as: “New Holland (New South Wales)”.

Hollister (1957) designated two neotypes (USNM 615769) for this strictly Carolinean species, collected from shallow water near Charleston, South Carolina. Snyder et al, 2012, restricted it to the 86.5 mm specimen. Hollister’s description follows: “The shell is fusiform, stout, with extended spire and smooth, convex whorls. The nucleus is smooth, globose, caplike, of about one and a half whorls. The suture is simple. There is no spiral sculpture except for oblique threads on the back of the canal, and no axial sculpture except very fine growth lines. The color is ivory overlaid with longitudinal flammules of mauve. There are distinct spiral lines of maroon, six primary ones on the body whorl and two on each of the earlier whorls. The aperture is oblique, ovate, pale blue-white within, and finely lirate. The columella is arcuate. There are three oblique plications just above the entrance to the canal, the middle one most prominent and the posterior one nearly obsolete. There is a glaze over the parietal whorl, and a strong ridge emerges just in front of the suture and extends to the edge of the glaze. The canal is short, oblique. The operculum, missing from these specimens, is unguiculate.” The larger of these two shells is 86.5 mm long and 40 mm wide at 7 5/8 whorls, with a pleural angle of about 45 degrees.

Like most *Cinctura* species, this varies (although not always smoothly) as a cline from short and stout in shallow water to more elongate and narrow in deepwater specimens (**Fig. 9b**). William Lyons (personal communication, 2012) verified this through extensive collecting (including systematic dredging) starting in 1971 (Lyons, 1989). He also determined that color varied with water depth and bottom type, except for albino and orange varieties that usually form distinct colonies.

Offshore specimens of this species are generally relatively narrow, elongate and generally have dull orange to bright red flammules. These include the common variety named *C. h. keatonorum*, from the Cape Canaveral, (eastern Florida) scallop shell dumps (**Fig. 9b**), although known also from further north. These forms are fairly distinct. Another named offshore variety, from off the Tortugas, is *C. tortugana*. Hollister described the shells as having the same apical sculpture as *C. lilium*, which, however, they do not. There are ribs and spirals, but they are all post-protoconch, unlike *C. lilium*. This discrepancy was first noted by Bill Lyons (private conversation, 2012). I examined the types (PRI 20824) in the Paleontological Research Institution at



Fig. 9b *Cinctura hunteria* (var. *keatonorum* Petuch, 1993), 96 mm, trawled by scallop boat from Port Canaveral, Florida, 1985; variety *keatonorum*. A relatively narrow specimen. Note extra lines added in maturity, two lines on upper whorls and short, broad siphonal canal.

Ithaca N.Y. and verified the lack of protoconch sculpture.

This usually relatively narrow variety is best characterized by the flammules, which are dull brown to bright terra cotta red against a creamy white background. These do not raise to the level of species distinctions. Although there may be cryptic species (as in *F. tulipa*), it would require more proof.

C. hunteria, although generally easily identified, actually has a fair bit of diversity in shape (from short and wide to long and narrow), as well as color. The sculpture varies in both deepwater and shallow water forms. Some shallow water specimens shown from east-central Florida (as per Marlo F. Krisberg's excellent online forum, *Let's Talk Seashells* (http://z14.invisionfree.com/Conchologist_Forum/index.php?showtopic=166) retain post protoconch axial ribs for one or two whorls, without spiral cords, although the shallow water west Florida specimens I've examined have no more than faint spiral scratches, visible only on fresh, immature specimens. *C. hunteria* as described, and for most specimens I've seen, totally lacks protoconch sculpture and lacks spiral cords and ribs on early teleoconch whorls, however I have a specimen of variety *keatonorum* from north-east of Cape Canaveral, Florida, dredged by scallop boat from about 125 feet deep, that shows three very weak ribs, followed by five very weak spiral cords visible for less than a full whorl. Note that only the smallest of four specimens of this lot has any sculpture preserved. I also have a few small specimens of unknown province with post-protoconch spirals but no ribs. I have a shallow water, immature specimen from South Carolina that has four axial ribs at the beginning of the teleoconch, intersecting

about one very weak whorl of spiral cords. The deepwater variety *tortugana* has both post protoconch axial and spiral sculpture. *C. hunteria* was apparently evolved from the middle Pleistocene *C. evergladesensis* Petuch, 1991, which has the common $\frac{1}{2}$ whorl of axial protoconch ribs followed by up to two whorls of post-protoconch axial and spiral sculpture. Genetic characteristics can be hidden (not expressed) although not lost, and later show up with little or no genetic change.

The common, shallow water, broad, late Pleistocene to Recent forms are well known. This species is known from North Carolina, to the Tortugas, to Mobile Bay, Texas; and the Campeche Banks. The neotype has mauve flammules, others have salmon color, brown, bluish or light olive green flammules. As is the case with most specimens of *Cinctura* and *Fasciolaria* species, there are usually light bands at midwhorl, at the base of the body whorl and on the apical end of the siphonal canal. The strength of the color bands varies from very fine, light maroon, to wide, almost black. Deepwater forms often show extra, thin color bands between the main bands (Fig. 9b). As they elongate, they may show three color bands on the penultimate whorl, but early whorls will show just two. The opposite problem can be seen on shallow water, broad forms, where one of the two color lines is covered on the early whorls. There are colonies (e.g. at the Matanzas Inlet, St Johns County, Florida, that have light orange flammules and color lines, probably genetically missing a dark component of the shell color.

Although most collectors are familiar with the broad, 60 to 75 mm shallow-water form of *C. hunteria*, Sunderland and Sunderland (1999) picture a 115 mm specimen from 30 feet deep off Everglades City, Florida. I have 10 small specimens of *C. hunteria* from the base of the shallow water late Pleistocene Fort Thompson Formation from a pit in Okeechobee, Okeechobee County Florida. These show a great range of pleural angle, 43 to 58 degrees, implying that homeostasis had not yet set in. Guido Poppe has a nice set online showing some of the variation (https://www.conchology.be/?t=764&family=FASCIOLARIIDAE&species_science=Cinctura%20hunteria&species_text=&species=Cinctura%20hunteria).

Note that H.E. and E.H. Vokes (1983) report *F. hunteria* as coexisting with *F. lilium* in shallow water of the Yucatan Peninsula from Campeche to Ciudad del Carmen, and therefore they cannot be subspecies. I (Aigen, 2002) followed Abbott (1974) in assuming that these very similar species are best considered as subspecies. Trying to be conservative but ending up simply wrong is not conservative. Also *C. lilium* apparently evolved directly from the early Pleistocene (Caloosahatchee Formation), *C. apicina* while *C. hunteria* evolved later, from a middle Pleistocene (Bermont Formation) species (*C. evergladesensis* (Petuch, 1991)) that succeeded *C. apicina* in Florida.

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1. *Fasciolaria tulipa* Linnaeus 1758, 162 mm, North Carolina to Panama, (including the Gulf of Mexico) and the northern Caribbean. 2. *Fasciolaria bullisi* Lyons, 1972, 130mm, deep water, western Florida (holotype) and north of the Yucatan Peninsula. 3. *Fasciolaria delicatissima* Garcia, Lyons and Snyder, 2016, 182 mm, north of Cayos de San Andres, Caribbean Sea, Columbia. 4. *Fasciolaria guyanensis* Lyons and Snyder, 2016, 121 mm, Guyana to northeast Brazil. 5. *Fasciolaria hollisteri* Weisbord, 1962, 92 mm, Lesser Antilles and adjoining coastal Venezuela and Columbia and Panama. 6. *Fasciolaria tephрина* de Souza, 2002, 220 mm, deep water along edge of the continental shelf (ranging from 400 to 500 meters deep) bordering the Caribbean coasts of Honduras and Nicaragua. 7. *Cinctura lilium* (Fisher, 1807), 98 mm, Campeche Bank and possibly offshore of Texas. 8. *Cinctura branhamae* (Rehder and Abbott, 1951), 106 mm, Gulf of Mexico, from the Yucatan Straits to the Tabasco-Campeche Basin. 9. *Cinctura hunteria* (G. Perry, 1811), 59 mm, Atlantic coast of the Carolinas to Florida.

As if by magic

Annie Olson

I went to the mailbox today and there was my favorite magazine! My *American Conchologist* for October of 2019. My routine is to look first at the front and back covers, appreciating what's been selected. Then I open to page 2 and read the captions. Taking my time to enjoy. And last, I read the letter from Tom, our dear and faithful editor. Waiting for later to read the many thoughtful articles.

His last words seemed written with me in mind, explaining the need for articles for the next issue, ending with these words. "So if you have been thinking of submitting a piece, now would be timely." I took the snail by the "horns" and called Tom right away and was invited to write this article. Hope you like it.

I'm as shy as the snails I have collected since I was a young child. So I've been intimidated to write my story for all of you. Unlike most of you, I never got the chance to seriously collect and do research. Although, if I'd picked a life occupation, it would have been the study of gastropods of the Gulf of Mexico, from Marco Island to Cedar Key, focusing mostly on the inter-tidal zone.

I learned to fly when I was 16 here in Holland, Michigan, instead. Three years later I met a man who was also pursuing flight. I thought he was a Japanese exchange student at Hope College, but he turned out to be a full-blood Tlingit Indian from southeastern Alaska. So I found myself catching salmon in my 40 fathom gill net in the sloughs of Lost River. I exchanged the warm water of the Gulf of Mexico for the cold water of the Gulf of Alaska.

My shell collecting now had to be done as time and money would allow, using catalogs and the postage service. As you can guess, my totem animal is The Snail. And like a snail, you can see in my words the whorls of my life. What I've eaten, where I've lived, and the predators that have tried to eat me, but I'm here, alive and able to write this.

My passion for gastropods began when I was only five. My grandma provided funds for us to travel from the cold of Holland, to the warmth of Ft. Myers Beach, the winter of 1950, staying at the Rancho Del Mar. I remember the tough grass on my tender feet, the scream of their peacocks, and the tiny pool. Most of all, I fell in love with the tidal flats and sea grass beds. And I remember this animal with a beautiful home it could make itself and then retreat into from danger.

I was like a newly hatched duckling imprinting on all the different snails hiding in the sand. I wanted to be a snail! Of course! And I'll never forget The Shell Factory on US41, the Royal Palms lining McGregor Blvd, Edison's home and laboratory, and the ferry to Sanibel.

To add dessert to our trip, we flew a DC-3 to Cuba, staying at the Hotel Nacional de Cuba and swimming alone in their famous saltwater pool. I saw the book offer in this



My small entry for the 2001 Sanibel-Captiva Shell Fair.

issue of *American Conchologist* for Cuba land snails and I recall a lovely documentary a few years ago featuring a woman who took advantage of the isolation of Cuba to study them extensively.

A lot has taken place since I wrote the intro for this article. Wishing I lived on some tropical island, all alone to compose these words, but I don't. I live in a condo with my husband of 20 years, who made it possible for me to exhibit these shells I form of polymer clay for the 2001 Sanibel-Captiva Shell Fair. And now I am his care-giver. So, in a way, this is his story too. Being there, encouraging me, as the shells evolved.

October 15, 1987, was the pivot point that birthed these shells. I had been asked to give a talk for Grand Valley State, the college from which I was about to graduate. I got out my books on Native American issues to prepare myself. Not knowing I was about to be zapped. Zapped into knowing now with my heart, not just my head, what we as a nation had done to get the land. Especially by these words of Black Elk.

"And I saw that the sacred hoop of my people was one of many hoops that made one circle, wide as daylight and as starlight, and in the center grew one mighty flowering tree to shelter all the children of one mother and one father. And I saw that it was holy."

"Black Elk Speaks" by John Neihardt

I realized the hoops were composed of the rock, the plant and animal nations too. Not just the human nations. This knowing awoke me to environmental issues in a new

Clay creations by Annie Olson on opposite page (pg. 33).

1. Assorted beige and pink shells. 2. Blue, black, and tan auger shell with coiled shells. 3. More blue based shells. 4. Red octopus. 5. Earth colored land snails. 6. Assorted colors in a box of fossil shells.





An assortment of clay shells in a large clay clam shell I purchased during a trip to Sanibel Island with my husband and two small children in 1972.

way. I was seeing anew my shell collecting. I had to admit to myself that I collected shells only for my pleasure. And that for me it was wrong. So I quit. Cold turkey.

Well, the desire to have shells to collect and organize never left me. And my inner person who woke me up was prepared, it seemed, to show me a different way.

I had a nudge in 1991 to attempt making an auger type shell. It was a cold winter day and I was in front of the fireplace in my folks home. A brass sculpture of sandpipers over the mantle. I rolled a long tapered cone of white polymer clay. My fingers working together brought into being my first crude gastropod. My fingers acting like the mantle that forms natural seashells.

For nine years I made thousands of shells. Trying to capture the essence of colors, etc., that adorn real shells, but I always fell short. It was as if the form, like the melody of a song, was waiting for the lyrics to appear.

It was winter again. January of 2001, and it happened. I rolled the cone with the colored clay. Forward over and over again. Not back and forth as I done for nine years now. Simple. Obvious. I should have known. I was so focused on forming a perfect tapered cone, I ignored what I knew. How a real marine snail "paints" color and pattern

on its shell. Depositing calcium carbonate and the minerals that compose the colors as it spirals around. The mantle doing all the work.

I looked down and saw what I'd done. Realizing this was the way for me to express the essence of coloring upon my shells. Melody and lyrics together. Improving each other as I made shell after shell.

For the next few hours, I made at least 100 shells. Then I went out and bought a nice wood bowl to put them in once they were baked. Got my magnifying glass out to look at them. And then had the surprise of my life.

"They look real!"

I'm not an artist. I'm not a scientist, either, but I have always loved snails and their shell homes. I have also loved the feel of polymer clay. And I have also loved color.

The three joined together to now satisfy the shell collector in me. In a new way. Collecting multiple color combinations instead.

This is how I ended up in the 2001 Sanibel-Captiva Shell Fair.

There is so much more to this strange story. Why I'm writing a book about these snail children of mine. With the desire to teach others how to form them, and by so doing, connect with the very animals who make the shells we study and appreciate so much.

I have been showing people how I create my shells for almost 20 years now. And I was shocked again! Most people don't get it. Don't get it that a live animal makes these 'Jewels of the Sea'. So ready to teach us about this beautiful planet we call Earth.

I find it so ironic! Slugs are an animal that most people find repulsive, not realizing the seashells they love so much are formed by a similar animal.

I invite you to go to my website: www.essenceofthespiral.com to see more photos and read text I wrote for the shell fair, and to see all the things I make with them. Just like real ones.

Thanks for hearing my story. Not just reading it.

Annie Olson
I love texting
616-422-3729
841 Brook Village Court
Holland, MI 49423
My email is annieolson1943@yahoo.com
I do better with texting



COA Academic Grants 2020

❖ COA Grants Committee

- Jann Vendetti: Chair, Curator of Mollusks, Natural History Museum of Los Angeles County
- Andrew Kraemer, Department of Biology, Creighton University, Omaha, Nebraska
- Jinghchun Li, Professor and Curator of Invertebrates, U. of Colorado, Boulder

❖ Applicant/Application details

- ❖ 34 applications: USA (22), Argentina (4), New Zealand (1), Portugal (1), Spain (1), Germany (1), U.K. (1), Ireland (1), Norway (1).
- ❖ 16 grants awarded: 6 Ph.D. students, 5 masters student, 3 postdoctoral researchers, 1 undergraduate, 1 research scientist.
- ❖ Geography of award recipients: USA (12), Argentina (1), and China/Hong Kong (1), New Zealand (1), Ireland (1).

❖ Named awards

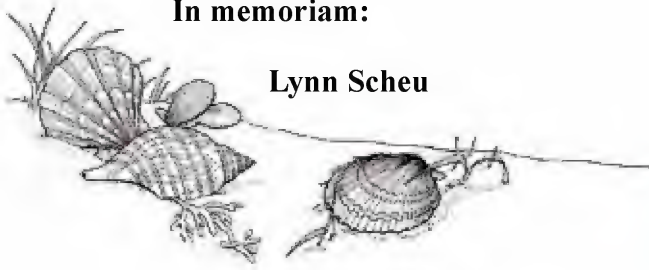
- Paul and Heather Johnson Award: **Fernando Á. Fernández-Álvarez**, Nat. Un. of Ireland, Galway
- Jacksonville Shell Club Award: **Sandra Muro**, California Poly. State University, Pomona, USA
- Walter Sage Memorial Award: **Rodrigo B. Salvador**, Museum of New Zealand Te Papa Tongarewa
- Clench and Turner Memorial Award: **Omar M. Zayas Cruz**, University of Puerto Rico, Mayagüez
- Frederic Weiss Memorial Award: **Xochitl S. Clare**, University of California, Santa Barbara
- Toto Olivera and Donald Dan Award: **Nicole K. Recla**, University of Idaho
- Anne Joffe Award: **Matthew Souza**, University of the Virgin Islands

• Total grant sum awarded: \$25,844

Recipient	Project title	Institution	Location	Academic status
Aaron Bower	Phylogenetic Analysis of <i>Campeloma</i> (Architaeniolossia, Viviparidae), a Group of North American Freshwater Snails	Southern Illinois University	USA	seeking Masters
Alessia Carini	Mussel shell organic matrix plasticity under ocean acidification	The University of Hong Kong	China/Hong Kong	seeking Ph.D.
Fernando Ángel Fernández-Álvarez	Reconstructing the evolutionary history of flying squids (Family Ommastrephidae Steenstrup, 1857)	National University of Ireland Galway	Ireland	Postdoc
Kelly Martin	What governs population structure in isolated ecosystems?	University of Idaho	USA	seeking Ph.D.
Lellén Luciana Gracia Villalobos	Histopathology in the mussel <i>Mytilus platensis</i> by the exposure to the toxic dinoflagellate <i>Alexandrium catenella</i>	Centre for the Study of Marine Systems	Argentina	Postdoc
Lindsey Schwartz	Energetics of thermal tolerance in <i>Mytilus</i> mussels and their hybrids	University of South Carolina	USA	seeking Ph.D.
Marlene Chiarello	The microbiome of the freshwater mussel <i>Amblema plicata</i> : Its potential vulnerability to the invasive Asian clam <i>Corbicula</i> spp.	University of Mississippi biologist (postdoc)	USA	Postdoc
Matthew Souza	Impact of the Invasive Seagrass <i>Halophila stipulacea</i> on Juvenile Queen Conch (<i>Strombus gigas</i>) Predation	University of the Virgin Islands	USA	seeking Masters
Nicole K. Recla	Investigating Morphological and Behavioral Adaptations to Visual Predation in Galápagos Endemic Land Snails	University of Idaho	USA	seeking Bachelor's
Olivia A. Stogner	Determining if African land snails (<i>Lissachatina fulica</i>) are ingesting <i>Toxoplasma gondii</i> oocysts in Oahu, Hawaii	Auburn University	USA	seeking Masters
Omar M. Zayas Cruz	Population Connectivity of the Common Octopus (<i>Octopus vulgaris</i>) and Management Implications	University of Puerto Rico, Mayagüez	Puerto Rico	seeking Masters
Racine E. Rangel	Do climate conditions affect host-parasite relationships in the Eroded Periwinkle Snail (<i>Littorina keenae</i>) and the Western-banded Tegula (<i>Tegula eiseni</i>)?	University of California, Irvine	USA	seeking Ph.D.
Rodrigo Brincalpe Salvador	Molecular phylogeny of Brazilian orthalicoid land snails: unveiling the relationships of Bulimulidae and Simpulopsidae with a multi-locus approach	Museum of New Zealand Te Papa Tongarewa	New Zealand	PhD-level biologist
Sandra Muro	Phylogeography and cryptic speciation in <i>Julia</i> (Heterobranchia, Sacoglossa)	California State Poly. University, Pomona	USA	seeking Masters
Xochitl S. Clare	Examining the effects of marine heatwaves within and outside protected areas for an economically important temperate sea snail, the Kellet's whelk (<i>Kelletia kelletii</i>)	University of California, Santa Barbara	USA	seeking Ph.D.

In memoriam:

Lynn Scheu



Lynn McLaughlin Scheu (1942-2020) passed away at home in Eugene, Oregon, in April 2020. Most COA members knew her as a resident of Louisville, Kentucky; but in 2019, she moved into an assisted care apartment in Eugene. Lynn was a fixture of COA for decades and worked tirelessly to both support and improve our organization. She, husband Richard (1940-2019), and sons Michael (of Eugene) and David (of St. Louis) moved to Louisville in the 1960s, where Richard started a new business (Compensation Tax Management) and Lynn taught English. Lynn, along with Anne Joffe, Donald Dan, and Walter Sage, started the Louisville Conchological Society. The club became a vibrant organization with members that also included: Alan Gettleman, Roberta Cranmer, Bobbi Houchin, and Millie Neudecker. With encouragement from R. Tucker Abbott, the club joined COA. In 1987, COA President Anne Joffe appointed Lynn as editor of what was then named the *COA Bulletin*. About Lynn, Donald Dan stated, “Lynn being an English teacher was highly learned in English composition, and took over editing various newsletters, eventually taking over the editor’s job of our COA magazine, establishing its basic format. I looked up to her for guidance on many occasions as she had the most helpful personality.”

One of Lynn’s first actions was to change the name of the *COA Bulletin* to *American Conchologist*. According to Lynn, she received a bit of heat over this, but believing it was a necessary step to upgrade from a club newsletter to a professional publication, she held firm and *American Conchologist* became accepted as the COA publication. About Lynn as editor, Linda Brunner said, “Lynn was a professional editor who expertly honored the author’s intent while making it more clear and readable. She combined the scientist, the amateur collector, and the people who are a part of COA into a single unit. It was amazing to watch.”

Lynn was also responsible for mailing the journal to our readers. This meant that four times a year, a 250-300 lb pallet of *American Conchologist* would arrive at her door, to be carried in, broken down, stuffed in envelopes, inserts added as necessary, labels correctly applied, sorted by zip code, and then carried to the local post office for mailing. A part of this labor fell on husband Richard. When Lynn gave up the editorship in 2001, she kept the mailing chore, but a



Richard and Lynn Scheu at home in Louisville in 2018.

traffic accident and other health issues eventually meant that instead of the two of them mailing out each issue – the duties fell primarily on Richard. I had a few conversations with both of them about giving up this rather onerous job, but both felt it kept them in touch with COA and they wanted to continue as long as they were able. They continued to sort and mail the journal until Richard passed away in 2019.

While pursuing her editorship duties, Lynn recognized the growing importance of social media and the Internet. She, along with Rich Goldberg, the late Debbie Wills, Dr. Gary Rosenberg, John Caldeira, Emilio García, and COA President Linda Koestel, formed the *Lambis* Group. Their two-pronged effort: establish a COA website with information about COA and conchology (conchologistsofamerica.org) and a Listserv where members (from scientific malacologists to amateur shell collectors) could share information and learn more about mollusks in general (Conch-L). Lynn, along with Linda Brunner and Amy Edwards were the original “moderators” of Conch-L, responsible for its content. This prevented problems often encountered on social media with hate messages, advertisements, political agendas, etc.



(Left to right), Lynn Scheu, Bobbi Houchin, and Walter Sage at the 1990 Astronaut Trail Shell Club Shell Show, Melbourne, Florida.

Linda Brunner wrote:

As my friend we sometimes talked for hours on the phone. If I had to choose words to describe her, two of the first would be enthusiastic and honest. She was as at home reading a French novel as she was reading an English one. One only has to look at her years of AC to get a glimpse of her creativity. She turned her dining room into a library with the walls covered in books. Lynn was often a sounding board for me. She provided insight while playing Devil's Advocate. She made me think. Lynn was the first person to call when hurricane Michael wrecked my city. Together we created the best bread pudding I have ever eaten. It was for a mid-year board meeting that we held in Louisville. She had dried apricots, some apricot brandy, and bread. The rest is history. There were no leftovers. I could ramble on and on but will spare you.

Like Linda, I spent some hours talking to Lynn over the years. Her advice from experienced editor to neophyte editor was invaluable. She had a soft, low, calm voice and a great sense of humor. Although I had written for Lynn, it was not until the Louisville COA Convention of 1999, that we actually met. We mostly conversed by email, but in Louisville she convened a Conch-L meeting to discuss the COA listserv and ways to improve it. There were only a dozen or so at the meeting, but Lynn was a driving force and soon had everyone participating and talking about ways to make

Conch-L serve the needs of both the COA organization and nonmembers who were just getting interested in shells and shell collecting.

In late 2001, she called and asked me to take over as editor of *American Conchologist*. This sounds simple enough, but Lynn could also be brutally honest. That night on the phone, she said, "Tom, you weren't my first choice, but [name withheld] said no, so I called you." I laugh at that invitation to this day. It was pure Lynn Scheu.

Lynn's final action of COA support was to donate her extensive shell collection and publications to COA. In September of 2019, my wife and I flew to Louisville, rented a pickup, and loaded shells and books for a trip back to New Mexico for initial sorting and packing (13 large boxes of shells and hundreds of

pounds of books) to mail to John and Cheryl Jacobs for final sorting for COA auctions. Two additional boxes of really nice shells went to Dave Green for oral auction material. Lynn believed in COA and gave her all to assure a quality organization - three plus decades of service. She will truly be missed.

Tom Eichhorst
thomas@nerite.com



Lynn at home (~2000) with a copy of the latest *American Conchologist*, the journal she created from the original COA Bulletin newsletter.

Investigating patterns of post-metamorphic dispersal of the marine snail *Lacuna vincta* between eelgrass- and kelp-dominated habitats

Sasha Seroy, Graduate Student, University of Washington
 Toto Olivera and Donald Dan Award Recipient 2019
 Conchologists of America research summary

Marine snails are ecologically important grazers in coastal kelp and eelgrass beds of the Pacific Northwest. In particular, the snail *Lacuna vincta* (Montagu, 1803) inhabits both environments, feeding heavily on kelp and eelgrass-associated diatoms using its radula. *L. vincta* continuously generates new rows of teeth at the beginning of the radula and sheds old used teeth at the end of the radula. *L. vincta* exhibits plastic radula morphology, dependent on the food source available. They produce sharp teeth in kelp habitats to tear kelp and consume it directly. Conversely, they produce flat teeth, which help scrape nutritious diatoms from eelgrass blades in eelgrass beds (Padilla, 1998 & 2001). Prior experiments show these diatoms are a high-quality diet promoting higher snail reproduction, but are only seasonally available in the summer.

When threatened by predators, *L. vincta* exhibits escape behavior in which they jump from their substrate via mucus parachutes that enable them to drift on currents to avoid predation (Martel & Diefenbach, 1993). This behavior can cause snail dispersal between habitat types and result in the arrival to a habitat that does not match tooth morphology. Therefore, *L. vincta* record a history of past habitats in their

radula.

Using clues from tooth morphology, I set out to investigate *L. vincta* dispersal patterns at the University of Washington's Friday Harbor Labs. I hypothesized that instances of mismatched snails would be dependent on site-specific current speeds, which enable dispersal, with higher flow habitats containing more snails with mismatched radula morphologies.

To test this hypothesis, I conducted field surveys around San Juan Island, WA, in the summer of 2019. I surveyed snails at each of four field sites, two dominated by eelgrass and two dominated by kelp, over several sequential low tide series to measure the radula morphology frequencies. I dissected snails to extract and image radulae under the microscope. Snails were classified as (1) completely matched: shape of all teeth matched the collection site habitat and snails were presumed residents of that site, (2) transitioning: newly-formed teeth matched the collection site habitat, but old teeth did not, indicating the snail had recently arrived there, or (3) completely mismatched: no teeth matched the collection site habitat, signifying the snail was a completely new arrival to the site.

In eelgrass beds, snails with matched and transitioning tooth morphologies increased throughout the summer. This result suggests immigration to eelgrass habitats over the season, possibly to take advantage of seasonally available diatoms. In kelp beds, snails with matched tooth morphologies decreased over the summer, potentially indicating dispersal away from these sites.

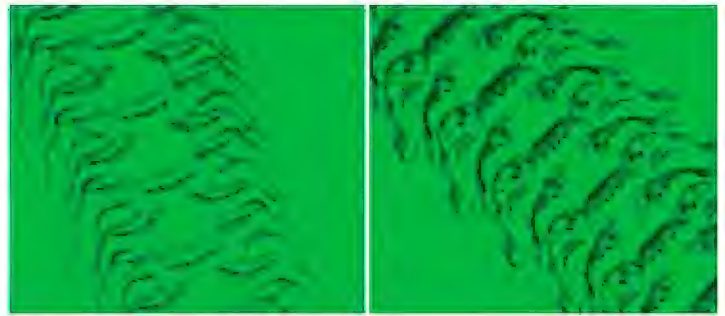
To investigate the relationship between radula-based dispersal patterns and water flow, I designed, constructed, and deployed custom current speed sensors at each snail collection site. Faster current



A current speed sensor deployed in the field (above water, top view). Sensors were built using a microcontroller with all electronics encased in a waterproof PVC housing and mounted on a float to continuously collect data. Sensors were powered with a solar battery.



A sensor suspended in a flow tank at Friday Harbor Labs (underwater, bottom view). Propeller components were designed using CAD software and 3D printed.



Left – Flat tooth morphology induced by snail consumption of eelgrass-associated diatoms.

Right – Sharp tooth morphology induced by snail consumption of kelp.

speeds corresponded with more mismatched snails at kelp sites, but not at eelgrass sites. This suggests that snails may stay in eelgrass habitats, even when current speeds are high, potentially to take advantage of the high-quality food in these habitats. Therefore, behavioral choice may be another possible mechanism influencing observed dispersal patterns. Alternatively, differential predation pressure across habitats may also be a contributing mechanism. Because diatom consumption increases snail fecundity, dispersal to and retention in eelgrass sites may have important implications for population dynamics of this important grazer.

References:

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Montagu, G., [E. Dorville, ill.]. 1803. *Testacea Britannica, or, Natural history of British shells, marine, land, and fresh-water, including the most minute : systematically arranged and embellished with figures (part 1)*. J.S. Hollis, London. pp. 183, plus 30 plates. avail. online: <https://www.biodiversitylibrary.org/item/78694#page/9/mode/1up>

Padilla, D.K. 1998. Inducible phenotypic plasticity of the radula in *Lacuna* (Gastropoda: Littorinidae). *Veliger* 41: 201-204.

Padilla, D.K. 2001. Food and environmental cues trigger an inducible offense. *Evolutionary Ecology Research* 3: 15-25.



Lacuna vineta illustration by E. Dorville, plate 20, fig. 3, in *Testacea Britannica...* by Montagu, 1803.



Lacuna vineta with faded stripes and intact periostracum, on rocks, Crabtree Point, North Haven, Maine, digital image by Joel Wooster, courtesy of www.jaxshells.com.

83rd Annual Sanibel Shell Show, March 5-7, 2020

Joyce Matthys
Co-chair, Sanibel Shell Show



On 1 March 2020, setup day for the 83rd Annual Sanibel Shell Show, Florida confirmed its first two coronavirus cases: one in Manatee County and one in Hillsborough County. Despite the fact that these two counties are over two hours away from Sanibel, I could not squelch my fears about the impact this might have on the shell show attendance. Four days later, when the shell show opened to the public, officials announced the first case in our own Lee County, and the first two coronavirus deaths in the state. Now I was extremely concerned about the financial success of the show.

I arrived at the Sanibel Community House on opening day at about 8:00 AM. By 8:30, my fears were eased as people started gathering on the Community House grounds. Maybe it was because fears related to the virus were minimized by the reaction of our government, or possibly it was because most people really did not understand the implications of being in a large crowd. Maybe having only one case in Lee County, of what would become known as Covid-19, made us feel less susceptible. At any rate, the crowd grew and by the end of the show over 3,000 people had donated the requested donation of \$5 to attend the show. Knowing now what I didn't know then, I shudder when I look back at this photo taken the first day of the show.

There were 81 entries in the Scientific Division of the show and 214 entries in the Artistic Division. The Scientific Division judges were MG "Jerry" Harasewych, PhD and Harry G. Lee, MD. Sharlene Totten and Phyllis Gray judged the Artistic Division.

The Conchologists of America Award and "Best Worldwide Shells, Any Source" were won by Pat & Bob Linn, Dunedin, FL. Ron Bopp, Bradenton, FL, was awarded the du Pont trophy and "Best Fossil Exhibit" and his *Vasum floridanum* won "Shell of the Show, Fossil." Marilee McNeilus, Dodge Center, MN, won "Shell of the Show, Any Source" for her *Sthenorytis turbina*.

In order to attract exhibitors who have previously won Sanibel's "Superstar" award over the past ten years, this equivalent of a Master's Trophy was retired and replaced with the "Sanibel Platinum Award." Gene Everson won this award with his 40 foot exhibit titled "Shells of the Eastern Pacific". His *Laevicardium elatum* won "Shell of the Show, Self-collected." (see pg. 43)

All profits from the annual Sanibel Shell Show are given out as grants towards mollusk research at colleges and universities, local environmental projects encouraging marine and water health, support of shell and natural history museums, and the promotion of molluscan education. Last year over \$30,612.00 was given out in grants.

The 84th Annual Sanibel Shell Show will be held March 4, 5, and 6, 2021.



We were lucky this crowd gathered before COVID 19 became a real issue.



Pat and Bob Linn won the COA Award for their exhibit of worldwide Haliotidae. They also picked up a blue ribbon and "Best Worldwide Shells, Any Source."



Marilee McNeilus, Dodge Center, MN, won "Shell of the Show, Any Source" for her rare and exquisite *Sthenorytis turbina* (Dall, 1908).

St. Petersburg Shell Club Shell Show Feb. 21-22, 2020

Our Annual Shell Show at the Seminole Rec Center, 9100 113th St. North, Seminole, FL, is open to the public on Friday from 10am-6pm and Saturday from 10am to 4pm. There are scientific and artistic displays along with dealers selling shells and related items. This year as in past years we had a large fun-loving crowd. The COA Award was presented to Lynn Gaulin for her presentation of "The Secret Code of Patterns," explaining color and pattern development in mollusks.



Lynn Gaulin and her superb display "The Secret Code of Patterns," won the Conchologists of America Award for the 2020 St. Petersburg Shell Show.



Pat and Bob Lynn won the Florida Museum of Natural History Award for thier display, "Abalones From Around the World." Their impressive display of worldwide Haliotidae involved over a dozen cases and posters.



Carolyn and Earl Petrikin won the National Museum of Natural History Smithsonian Institution Award for their exhibit, "You're Whelkome." Their display included large whelks as well as various growth series. Not to mention winning what looks like a solid gold octopus (Alice Monroe Educational Award)!

Conchologists of America Award through the years

Gene Everson & T.E. Eichhorst

Gene Everson has graced the pages of this journal innumerable times over the years, winning awards and trophies at just about every shell show he enters. We are all aware of his worldwide, self-collected shell collection, and his exhibits never disappoint. When I asked for material for upcoming issues, he immediately responded with the travelogue in the March 2020 issue and also sent me a marvelous collection of COA Award images. These are his awards (he has 45) and show how the design of the COA Award had changed over the years. Enjoy. And thank you Gene for your support.



1. The first COA Award was given by the Astronaut Trail Shell Club in 1979, no shell logo.



2. In 1981 the award was changed to this 12-inches-high plaque, shell logo turned at 45°.



3. In 1982 the style was similar but the size was reduced to 10 inches, shell logo turned beyond 45°.



4. 1985 and another style change and back to 12 inches, shell logo straightened vertically.



5. 1987 and another change, from a black background to a gold background, shell logo is the same.



6. 1989 and a change to show the winner's name for the first time, with a divided brass plate.



7. 1991 had a very heavy stone award plaque.



8. 1994 had a similar look but a very lightweight particle board either painted or veneered.



9. 1995 and still the current style, consistent for my last 33 COA Awards, except for a change in the shell logo in 2006.



10. 2006 and the shell logo now reflects the present day COA logo.



Some of the COA Awards in Gene's house as well as a few du Pont Awards.



More COA Awards and the newer du Pont Awards.



(Left) Gene Everson with the "Sanibel Platinum Award" at the 2020 Sanibel show. This is a replacement for the Sanibel "Superstar Award," the equivalent of a Master's Trophy, now retired after ten years. Gene won this award with his 40-foot exhibit titled "Shells of the Eastern Pacific." His *Laevicardium elatum* won "Shell of the Show, Self-collected."

